125. UR8

FAO Fisheries Synopsis No. 125, Volume 8

FIR/S125 Vol. 8

FAO SPECIES CATALOGUE

VOL. 8. FUSILIER FISHES OF THE WORLD

AN ANNOTATED AND ILLUSTRATED CATALOGUE OF CAESIONID SPECIES KNOWN TO DATE

FAO
fish.
synop.
no. 125
v. 8

UNITED NATIONS DEVELOPMENT PROGRAMME
FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

FAO SPECIES CATALOGUE

VOL. 8 FUSILIER FISHES OF THE WORLD

An Annotated and Illustrated Catalogue

of Caesionid Species Known to Date

prepared by

Kent E. Carpenter
Mariculture and Fisheries Department
Kuwait Institute for Scientific Research
P.O. Box 1638
Salmiya 22017
Kuwait

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

Rome, 1988

FAO
fish.
Synop.
no. 125
v 8

The designations employed and the presentation of material in this publication do not imply the expression of any opinion whatsoever on the part of the Food and Agriculture Organization of the United Nations concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries.

M-40

ISBN 92-5-102746-3

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted in any form or by any means, electronic, mechanical, photocopying or otherwise, without the prior permission of the copyright owner. Applications for such permission, with a statement of the purpose and extent of the reproduction, should be addressed to the Director, Publications Division, Food and Agriculture Organization of the United Nations, Via delle Terme di Caracalla, 00100 Rome, Italy.

© FAO 1988

PREPARATION OF THIS DOCUMENT

The author has recently completed a worldwide revision of this family which has been published in "Indo-Pacific Fishes", Honolulu, Hawaii, No. 15, Sept. 1987. Most of the taxonomic and ecological information presented in the present work was taken from this publication. However, the author subsequently had an opportunity to examine, with FAO support, further material of this family in various European Museums.

The FAO catalogue is designed specifically for the use of fishery workers, laying emphasis on field identification of the species accessible to the non-taxonomists, as well as on fisheries information. Unfortunately, such information is rather scarce and often unreliable due to dubious identifications in the past.

In view of the importance of coloured patterns as diagnostic characters for the species identification, colour plates for all species have been included. Most of these are photographs made by J.E. Randall, already published in the above-mentioned monographic revision.

All black and white drawings were prepared at FAO under the supervision of the author and the editors.

Technical Editors: W. Fischer and Nadia Scialabba, Fisheries Resources and Environment Division, FAO

Illustrator: P. Lastrico, FAO, Rome

ABSTRACT

This is the eighth in the FAO series of worldwide annotated and illustrated catalogues of major groups of organisms that enter marine fisheries. The present volume includes 20 caesionid species belonging to 4 genera. It provides comprehensive, illustrated keys and a glossary of technical terms and measurements. Individual accounts of species include drawings, scientific and vernacular names, information on habitat, biology and fisheries, and a distribution map. Lists of nominal species in the family and of valid species by major marine fishing areas follow the species accounts. The work is fully indexed and there is ample reference to pertinent literature.

Distribution

Author
FAO Fisheries Officers
Regional Fisheries Councils
and Commissions
Selector SM

For bibliographic purposes this document should be cited as follows:

Carpenter, K.E., 1988 FAO species catalogue. Vol. 8. Fusilier fishes of the world. An annotated and illustrated catalogue of Caesionid species known to date. FAO Fish.Synop.,(125)Vol.8:75 p.

TABLE OF CONTENTS

		Code	Page
1.	**INTRODUCTION**		1
1.1	Plan of the Systematic Catalogue		2
1.2	General Remarks on Fusiliers		2
1.3	Illustrated Glossary of Technical Terms and Measurements		10
2.	**SYSTEMATIC CATALOGUE**		15
2.1	General Aids to Identification		15
2.1.1	Diagnostic features of the family Caesionidae		15
2.1.2	Notes on the identification of fusiliers		15
2.1.3	Laboratory key to species		15
2.1.4	Meristic frequency distribution tables		21
2.1.5	Field key to species and colour plates		24
2.2	Information by Species		35
	Caesio	CAES Caes	35
	C. caerulaurea	CAES Caes 1	35
	C. cuning	CAES Caes 2	37
	C. lunaris	CAES Caes 3	38
	C. striata	CAES Caes 4	40
	C. suevica	CAES Caes 5	41
	C. teres	CAES Caes 7	42
	C. varilineata	CAES Caes 8	44
	C. xanthonota	CAES Caes 6	45
	Dipterygonotus	CAES Dipt	47
	D. balteatus	CAES Dipt 1	47
	Gymnocaesio	CAES Gymn	49
	G. gymnoptera	CAES Gymn 1	49
	Pterocaesio	CAES Pter	50
	P. capricornis	CAES Pter 5	51
	P. chrysozona	CAES Pter 1	52
	P. digramma	CAES Pter 2	53
	P. lativittata	CAES Pter 6	55
	P. marri	CAES Pter 7	56
	P. pisang	CAES Pter 3	58
	P. randalli	CAES Pter 8	59
	P. tessellata	CAES Pter 9	60
	P. tile	CAES Pter 4	61
	P. trilineata	CAES Pter 10	63
3.	**LIST OF NOMINAL SPECIES OF CAESIONIDAE**		65
4.	**LIST OF SPECIES BY MAJOR MARINE FISHING AREAS**		66
5.	**BIBLIOGRAPHY**		68
6.	**INDEX OF SCIENTIFIC AND VERNACULAR NAMES**		72

1. INTRODUCTION

This catalogue is intended primarily as an aid in fisheries and fisheries-related studies. Emphasis is therefore placed on including details useful for identification, and available fisheries and biological information on the 20 species of caesionids. The taxonomic accounts are based on a recent revision by Carpenter (1985, 1987) which contain more details regarding the systematics of the Caesionidae than the present catalogue.

Fisheries information regarding caesionids is scarce in the literature. One reason for this lack of data is that fusiliers are of relatively minor importance in industrial fisheries, although they make up a significant part of artisanal multispecies catches in some countries. Caesionids are generally considered good eating but their market size is rather small (typically 17 to 40 cm in total length). They are common in markets throughout their range, but usually in small quantities. Fusiliers dwell primarily over coral reefs, where most commercial fishing gears do not operate. Therefore, caesionids are most commonly harvested by artisanal fisheries, and hence, catch statistics are not well documented. Where caesionids are fished in large commercial quantities, catch data are difficult to gather because they are part of a complex multispecies stock. In both artisanal and commercial fisheries, several caesionid species are usually caught together with a variety of unrelated species. In catch data, species of fusiliers are rarely reported separately, but rather, lumped together under a family heading.

In many areas, fusiliers are indirectly related to commercial fisheries, as tuna baitfish. In these fisheries, several species of caesionids are used, together with many unrelated species. No explicit data are available on quantity or proportion of fusiliers utilized as baitfish. Where caesionids are used as baitfish however, they are generally considered as one of the more important groups.

A factor contributing to the lack of specific fisheries information regarding fusiliers is the difficulty which existed in the identification of species in this family. One can compare the conflicting names assigned to species in recent works (i.e. Masuda et al., 1975; Schroeder, 1980; Shen, 1984; and Gloerfelt-Tarp & Kailola, 1984) to appreciate the confusion that exists. It is timely therefore, to report on the taxonomic status and fisheries-related information on caesionids, to aid in studies on tropical multispecies fisheries.

This catalogue is intended to be as self-contained as possible. A glossary of technical terms and illustrations are included to help minimize the necessity to refer to related literature. In order to avoid cluttering of the text, literature citations are confined to the "Bibliography," except in cases where it is necessary to refer to a specific work.

Acknowledgments

I offer special thanks to J.E. Randall who has helped me in many ways during the revision of the Caesionidae. I thank again everyone mentioned in my dissertation and revision paper who contributed to work on fusiliers during my graduate studies.

I extend my gratitude to the following persons and institutions who assisted during museum visits or provided loans of specimens: H. Ahnelt and H.J. Paepke (Naturhistorisches Museum, Vienna); G.R. Allen (Western Australian Museum, Perth); M.L. Awai and A.Y. Suzumoto (B. P. Bishop Museum, Honolulu), M.L. Bauchot and M. Desoutter (Muséum national d'Histoire naturelle, Paris); M. Boeseman and M.J.P. van Oijen (Rijksmuseum van Natuurlijke Historie, Leiden); W.N. Eschmeyer (California Academy of Science, San Francisco); M.N. Feinberg and C.J. Ferraris (American Museum of Natural History, New York); R. Gillet (South Pacific Commission); T. Gloerfelt-Tarp; M.L. Holloway and P.J.P. Whitehead [British Museum (Natural History), London]; S.L. Jewett, L.W. Knapp, L.P. Norrod, V.G. Springer, and J.T. Williams (United States National Museum of Natural History, Washington, D.C.); W. Klausewitz (Natur-Museum Senckenberg, Frankfurt); J.M. Leis (Australian Museum, Sydney); A.D. Lewis (Ministry of Fisheries, Fiji); B. Ranchod (J.L.B. Smith Institute of Ichthyology, Grahamstown, South Africa); W.F. Smith-Vaniz (Academy of Natural Sciences, Philidelphia); and R. Winterbottom (Royal Ontario Museum, Toronto).

I am grateful to P. Lastrico (FAO) who masterfully drew the figures for this catalogue. I thank W. Fischer who provided much-needed encouragement and support for museum visits through the Food and Agricultural Organization of the United Nations. I am grateful to V.G. Springer who facilitated partial support for research on fishes through the Leonard P. Schultz Fund of the Smithsonian Institution. The Open Grants of the East-West Center provided a degree participant grant which supported me through most of my graduate studies.

The revision of the Caesionidae was carried out in partial fulfillment of PH.D. requirements at the Department of Zoology, University of Hawaii. I thank my doctoral committee and committee chairman, J.W. Archie for their help and guidance.

Last, and never least, I thank my wife, Cecilia Luz, for her patience and encouragement during my ichthyological pursuits.

The editors are indebted to Dr J.E. Randall, Editor of "Indo-Pacific Fishes" for kindly permitting the reproduction of most of the colour illustrations printed in No. 15 of that series. Special thanks are due to Ms Giulia Sciarappa-Demuro for the page composition of this document. Ms Gloria A. Soave (FAO) has kindly revised the bibliography.

1.1 Plan of the Systematic Catalogue

A family description is given, followed by a key to all genera and species. The species accounts are arranged alphabetically by genera and species. Characteristics of subfamilies and subgenera are summarized under "General Remarks on Fusiliers." Each genus is introduced with its type reference, synonyms, and diagnostic features. Multispecies genera also have comments on general biology, habitat, distribution, and interest to fisheries. The information pertaining to each species is arranged by paragraphs, in the order listed below:

(1) **Scientific name:** The reference for the original description and the type locality are given.

(2) **Synonyms:** All invalid names and combinations that have been applied are referenced.

(3) **FAO Names:** FAO-accepted English names and tentative French and Spanish names are given for each species. The FAO English name is considered the standard to be used for fishery purposes. This should avoid confusion which can be caused due to the existence of multiple names for the same species or to the use of the same name for several species. The FAO name is not intended to supplant the use of local names but rather, to serve as a worldwide reference.

(4) **Diagnostic Features:** Distinctive characters of the species, as an aid for identification, accompanied by useful diagrams. These diagnoses should be consulted, together with the frequency distribution tables of fin ray and scale counts, to confirm species identified by using the illustrated key.

(5) **Geographical Distribution:** The general geographic range is given in the text and illustrated on a map. The map shading includes known areas of occurrence and intermediate areas between locality records where a species is expected to be found.

(6) **Habitat and Biology:** Information on habitat, behaviour, food habits and reproduction.

(7) **Size:** The approximate maximum total length.

(8) **Interest to Fisheries:** General information on the extent, type of fisheries, and utilization. Detailed fisheries data is unavailable for all species and therefore, only a qualitative assessment is possible.

(9) **Local Names:** These are given where published names are available. Often, a single local name is applied to several species.

(10) **Literature:** Recent references which contain illustrations that could be useful for identification. It is stated if an incorrect name is given in the reference.

(11) **Remarks:** Useful information which is not appropriately covered in the previous paragraphs. Frequently used incorrect scientific names are mentioned here.

1.2 General Remarks on Fusiliers

The caesionids are marine perciforms found only in the tropical Indo-Pacific. The English vernacular name for members of this family, "fusiliers", apparently derives from a military name. The term fusilier refers to certain formations of eighteenth and nineteenth-century infantry which were often characterized by flamboyant uniforms. Caesionids are colourful fishes; many have bright yellow stripes and patches. They are also synchronous schooling fishes. Hence, these fish are usually observed in formation, wearing colourful "uniforms".

Phylogenetic relationships and classification: The Caesionidae are related to the lutjanid or snapper fishes (see FAO Species Catalogue, Vol. 6). Johnson (1980) showed that the nearest relatives (sister group) to caesionids are the snappers belonging to the subfamily Lutjaninae. He used characters relating primarily to jaw musculature to prove this relationship. The fusiliers are recognized as a separate family within the snapper superfamily Lutjanoidea, because they possess unique morphological features characteristic of their feeding mode. The caesionids are specialized for plankti-

vorous feeding, while their nearest relatives, the lutjanine snappers, are typically benthic carnivores. The fusiliers possess a jaw morphology and body shape very distinct from typical snappers. The most striking of these specializations is the fact that the ascending premaxillary process is a completely separate ossification (Fig. 5). This process is confluent with the premaxilla in related perciforms. Fusiliers have a highly protrusible upper jaw which is an adaptation for picking zooplankton from the water column. The modification of the ascending premaxillary process is related to jaw protrusibility.

Within the Caesionidae, there are recognizable trends in jaw structure and body shape related to a presumable refinement of their adaptation to planktivory. One of these trends relates to jaw protrusion. Members of the more primitive genus *Caesio* have a single process on the premaxilla (named the postmaxillary process) projecting posteriorly, which is lateral to the median ascending premaxillary process. In the remaining, more derived genera of caesionids, there are 2 postmaxillary processes (Fig. 5). The additional process presumably allows greater control, and perhaps extent, of jaw protrusion.

Another trend within the caesionids relating to planktivory is the reduction of dentition. The closest relatives to caesionids, the lutjanine snappers, are primarily benthic carnivores with strong teeth suitable for grasping prey. These snappers commonly have enlarged canines in their jaws, and teeth on their vomer and palatines. Fusiliers feed primarily on zooplankton, and there is no need for a well developed dentition to seize and hold prey. They have small, weak teeth, and some species lack teeth on the vomer, palatines and premaxillaries. The most ancestral living caesionid species, *Caesio cuning*, has larger, more numerous teeth than other fusiliers. In addition, *C. cuning* is the only caesionid with a tooth plate on the third epibranchial. The snappers also possess this pharyngial tooth plate. The most derived caesionids, *Gymnocaesio gymnoptera* and *Dipterygonotus balteatus*, have very small teeth and lack teeth completely on their palatines and premaxillaries.

The trend in body shape of caesionids reflects an increased adaptation to a semi-pelagic, planktivorous existence. The more ancestral species are high-bodied, like their snapper relatives. The more derived ones are more slender, fusiform and elongate, similar to many pelagic fishes. The most derived caesionid species, *Dipterygonotus balteatus*, has a very slender and elongate body, compared with most other members of this family, and it has developed a mostly nearshore pelagic existence. Unlike all other caesionids, *D. balteatus* inhabits coral reefs only in the juvenile stage. As adults, members of this species are captured together with other nearshore pelagics such as sardines and anchovies.

Carpenter (1985) examined the relationships within the Caesionidae. There are 20 species, which can be subdivided into 2 subfamilies, 4 genera, and 6 subgenera (Fig. 1). The taxonomic categories above the species level were determined using a numerical technique which maximizes the information content and predictive value of the classification, within the framework of hypothesized cladistic relationships.

This classification does not follow the strict phylogenetic classification rules suggested by some authors (e.g. Wiley, 1981) although the phylogenetic hypothesis can be retrieved from an annotated classification (Carpenter, 1987). A phylogenetic style classification was rejected because it was found to contain a significantly lower information content and predictive value than the classification presented here. In addition, a phylogenetic classification would have been very different from the one commonly used, with potential confusion to fisheries scientists and other biologists. The phylogenetic hypothesis of the Caesionidae is given in Fig. 2.

The systematic accounts in this catalogue are organized alphabetically by the genus and species levels of classification ignoring subfamilies and subgenera. The genus is the most useful supraspecific taxon in caesionids for fishery and general taxonomic purposes. In comparative biology, systematics, and other studies however, it is often desirable to have a detailed understanding of relationships within a group. These relationships are largely based on osteological and meristic characters which may also be useful to the fishery biologist if he needed to identify mutilated specimens at least to subgenus level or to confirm species identification that remained inconclusive after use of the keys based on external morphological characters.

Tables I and II summarize those osteological and meristic characters most useful in delineating the supraspecific taxa of caesionids.

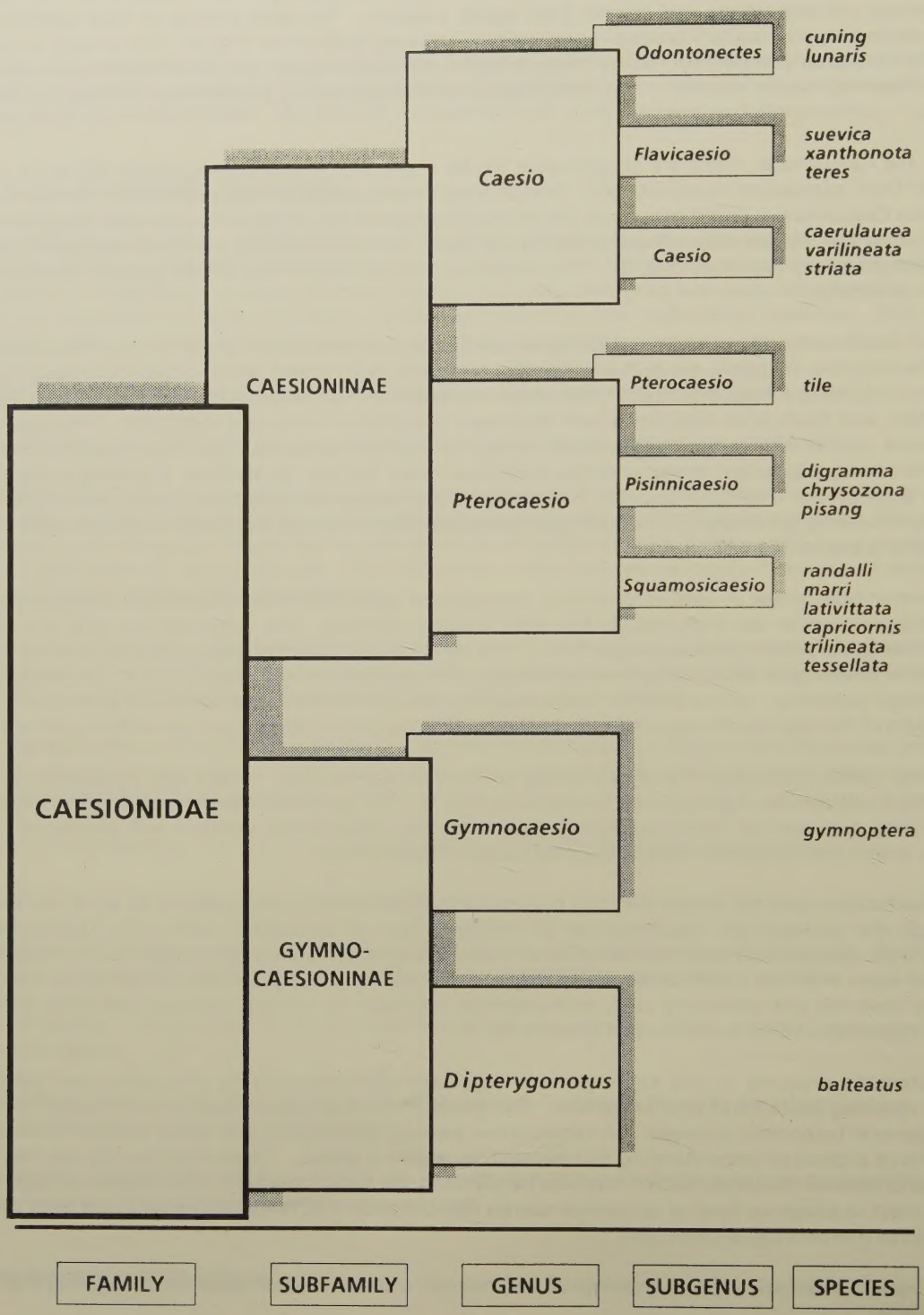


Fig. 1 Structure of the Linnean Classification of Caesionidae

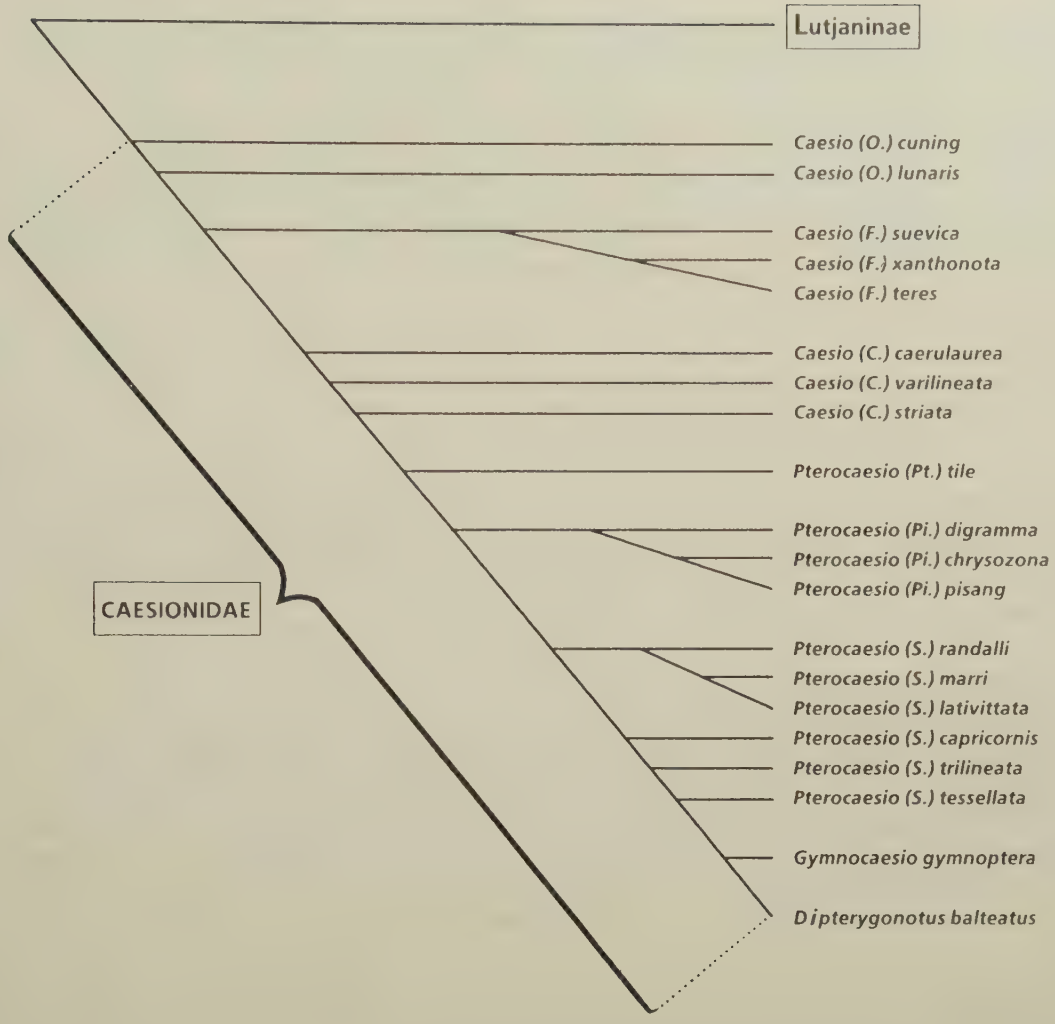


Fig. 2 Phylogenetic Hypothesis of the Caesionidae

TABLE I

Characters useful in Distinguishing Subfamilies and Genera within the Caesionidae

	Scales on median fins	Teeth on pre-maxilla	Number of pro-current caudal rays	Number of post-maxillary processes	Shape of posterior end of maxilla
Caesioninae					
Caesio	+	+	9-10	1	Blunt
Pterocaesio	+	+	9-10	2	Tapered
Gymnocaesioninae					
Gymnocaesio	-	-	7-8	2	Tapered
Dipterygonotus	-	-	7-8	2	Tapered

TABLE II

Characters useful in Distinguishing Subgenera within the Caesionidae

	Openings pars jugularis	Process type on basi-occipital	Typical epipleural ribs	Occipital-frontal crest	Process first neural arch	Process first epi-pleural	Process second epi-pelural	Teeth on palatines
Caesio								
Odontonectes	2-3	A	10-13	+ + +	-	-	-	+
Flavicaesio	3-4	B	13-14	+	-	-	-	+
Caesio	2	C	14	+ -	-	-	-	+
Pterocaesio								
Pterocaesio	2	C	14	-	-	-	-	+
Pisinnicaesio	5	D	14	-	+ + +	+	+ -	+
Squamosicaesio	5	E	14	-	+	-	-	-
Gymnocaesio	5	E	14	-	+	-	-	-
Dipterygonotus	5	F	14	-	(+)	-	-	-

Abbreviations used: **A** = no distinct process; **B** = small, indistinct process; **C** = distinct process, separated from condyle by prominent concavity on ventral surface of basioccipital; **D** = relatively large process directly adjacent to condyle; **E** = short, distinct process separated from condyle by a narrow concavity; **F** = horn-like process, separated from condyle by a narrow concavity; **+** = present; **+ + +** = very well developed; **(+)** = present in a different form than **+**; **-** = absent; **+ -** = variable, either present or absent

For an explanation of the characters presented in these tables, refer to the "Illustrated Glossary of Technical Terms and Measurements" in this catalogue.

The family Caesionidae (see Fig. 1) is divided into 2 subfamilies. The subfamily Caesioninae contains the genera *Caesio* and *Pterocaesio*. The Caesioninae are characterized by having scales on the median fins, teeth present on the premaxilla, a number of procurrent caudal rays typically 9 or 10 and, right and left ascending premaxillary processes easily separable from one another into 2 distinct pieces. The subfamily Gymnocaesioninae is comprised of the genera *Gymnocaesio* and *Dipterygonotus*. This subfamily is characterized by the absence of scales on the median fins, an edentate premaxilla, a number of procurrent caudal rays typically 7 or 8 and right and left ascending premaxillary processes not easily separable from one another into 2 pieces.

The genus *Caesio* is partitioned into the subgenera *Odontonectes, Flavicaesio*, and *Caesio*. *Odontonectes* includes the species *C.(O.) cuning* and *C.(O.) lunaris*. This subgenus is characterized by having typically 2 or 3 lateral openings in the pars jugularis, there is no distinct process on the basioccipital for attachment of Baudelot's ligament, usually 10 to 13 epipleural ribs, usually 11 soft anal rays, and a very well developed supraoccipital-frontal crest. *Flavicaesio* consists of the species *C.(F.) suevica*, *C.(F.) xanthonota*, and *C.(F.) teres*. This subgenus is distinguished in having 3 or 4 openings in the lateral wall of the pars jugularis, a small process on each ventrolateral surface of the basioccipital for attachment of Baudelot's ligament, 10 to 13 epipleural ribs, usually 12 soft anal rays and, a moderately well developed supraoccipital-frontal crest. The subgenus *Caesio* is comprised of the species *C.(C.) caerulaurea, C.(C.) varilineata* and *C.(C.) striata*. Members of this subgenus have 2 openings in the lateral wall of the pars jugularis, a distinct process on the basioccipital for attachment of Baudelot's ligament, typically 14 epipleural ribs, usually 12 soft anal rays and, a moderately well developed or not well developed supraoccipital-frontal crest.

The genus *Pterocaesio* contains 3 subgenera; *Pterocaesio, Pisinnicaesio*, and *Squamosicaesio*. The subgenus *Pterocaesio* contains a single species, *P.(P.) tile*. This subgenus is differentiated from other *Pterocaesio* by having 2 openings in the lateral wall of the pars jugularis, a small prezygopophysis on the first neural arch, no flattened projections on the first or second epipleurals, and teeth on the palatines. The *Pisinnicaesio* consists of *P.(P.) digramma, P.(P.) chrysozona*, and *P.(P.) pisang*. This subgenus is distinguished by having typically 5 openings in the lateral wall of the pars jugularis, a pronounced prezygopophysis on the first neural arch, a flattened projection on the first epipleural rib, with or without a flattened projection on the second epipleural rib, and teeth on the palatines. *Squamosicaesio* includes 6 species; *P.(S.) randalli, P.(S.) marri, P.(S.) lativittata, P.(S.) capricornis, P.(S.) trilineata*, and *P.(S.) tessellata*. The squamosicaesionids have 5 openings in the lateral wall of the pars jugularis, a slightly pronounced prezygopophysis on the first neural arch, no flattened projections on the first or second epipleurals, and no teeth on the palatines.

Habitat and Biology: As mentioned previously, fusiliers are planktivorous, schooling fishes. Their schooling behavior presumably relates to predation pressure; caesionids are actively preyed upon by reef residents and visitors such as groupers, snappers, jacks and tunas. During normal daytime activity, fusiliers swim actively in midwater around or near reefs in synchronous formation. When they encounter favorable feeding conditions (presumably when predation pressure is minimal, when the currents are suitable and patches of zooplankton are sufficiently dense), fusiliers break formation and assume a feeding aggregation. In these aggregations, they swim slowly and asynchronously, making quick, short lunges forward while picking zooplankton from the water column. Fusiliers can sometimes be observed swimming around "cleaner stations" on the reef, where some members of the aggregation slow down and interact with cleaner wrasses. During initial recruitment to a reef, juvenile caesionids generally remain in a restricted area close to the substrate. When threatened, they dart around, rather than in, coral heads and rocks in order to escape. At night, fusiliers are quiescent and remain close to the reef, often in crevices and under coral heads. During this time their body colour frequently assumes a blotched, reddish tinge.

Fusiliers often school in mixed species aggregations. It is not uncommon to see a school composed of 3 or 4 species. Species with similar markings, especially caudal markings, tend to be found most often in the same school. This strategy presumably allows greater numbers to join a single school, while individual members are not conspicuous. A highly noticeable constituent of a school would be more easily singled out by a predator. Therefore, fusiliers with a dark blotch at the tip of each caudal lobe, such as most species of *Pterocaesio* and the species of *Gymnocaesio*, often school together. The species with a black streak inside the caudal lobes, such as *Caesio caerulaurea, C. varilineata, C. striata*, and *Pterocaesio tile* may be found in the same school. *Caesio cuning, C. xanthonota*, and *C. teres*, all with yellow caudal fins, sometimes aggregate with one another. Juveniles of *C. lunaris* often have a yellow caudal fin and they can be seen schooling together with juvenile *C. cuning* close to the reef. As adults, *C. lunaris* typically loose this yellow caudal colouration and they no longer are seen schooling with *C. cuning*.

Fusiliers are primarily reef inhabitants, although they often range over soft bottoms while swimming from reef to reef. This is evidenced in that they are sometimes caught by trawlers, far from reefs. One species, *Dipterygonotus balteatus*, is found on reefs only as juveniles. As adults, they are typically caught together with sardines, anchovies, and other nearshore pelagic species.

The reproductive biology of caesionids has been examined in only a few species . They appear to be typified by early sexual maturity, and high fecundity. They have a prolonged spawning season, but recruitment peaks once or twice a year. Like their closest relatives, the snappers, fusiliers have separate sexes (dioecious), with no significant difference in sex ratio. Caesionids are gonochoristic (sex remains constant after maturity). Spawning behaviour has been reported for *Caesio teres* (Bell and Colin, 1985) and *Pterocaesio digramma* (Thresher, 1984). These caesionids spawn in large groups around the full moon. They migrate to select areas on the reef at dusk and initiate spawning during slack water. In *C. teres*, spawning is preceded by periodic mass vertical ascents and descents to within about 1 m of the surface. During spawning they stay near the surface and subgroups within the mass swirl rapidly in circles and release gametes. They subsequently descend and then rise again to the surface for further spawning bursts. This is repeated several times over the course of 10-15 minutes. *P. digramma* mass-spawns about 1 m off the bottom by drawing together in a tight group, releasing their gametes, and rushing apart.

Fisheries: Fusiliers are caught by many fishing methods. As mentioned, they are midwater, schooling fishes, and therefore most likely to be caught by nets. They are harvested over reefs by drive-in nets and gill nets, and over soft bottom by trawl nets. Fusiliers shelter on the reef at night and are commonly captured by fish traps designed to exploit this behaviour. They feed on zooplankton which makes them unlikely candidates for hook-and-line fisheries. In certain areas however, fusiliers are routinely taken by hook-and-line. Caesionids are caught by explosives in some areas. This method is however, illegal, and obviously of questionable application environmentally, especially in fragile coral reef habitats.

The development of reef fisheries in a particular area will largely determine the fishing methods to be used and the importance of caesionids to total fisheries production. In Sri Lanka for example, some reef fisheries are composed of numerous, small, wind-driven canoes using hook-and-line. These fishermen use small hooks and special techniques to catch fusiliers. Several species are common in markets in Sri Lanka where they command a medium-range price. In the Gulf of Thailand, trawls are the primary fishing gear and reef fisheries are not well developed. Here, *Caesio cuning* and

C. caerulaurea are a minor part of the catch in the trawl fisheries. In south-western Thailand however, fusiliers are caught principally with gillnets and fish traps.

Fusiliers are usually taken in multispecies catches; they are easily confused with other colourful fishes, particularly some species of Lutjanidae, a family from which they were separated only recently. Landing statistics available at FAO are still reported under Lutjanidae, and only a single genus (*Caesio*) is given separately (see Table III).

TABLE III

Reported Catch in Metric Tons of *Caesio* Species by Fishing Area, Country and Year

Country	Area	1983	1984	1985	1986
Indonesia	57	974	804	524	830
Area total	57	974	804	524	830
Indonesia	71	9 598	10 235	12 695	13 340
Malaysia	71	922	432	446	620
Philippines	71	17 595	19 817	16 278	15 063
Singapore	71	2 098	1 830	1 308	1 150
Area total	71	30 213	32 314	30 727	30 263
Species total	57 and 71	31 187	33 118	31 251	31 093

As a result of the paucity of landing statistics for individual species or even genera, and of the widespread confusion of fusiliers with species of other families, these figures probably represent only a fraction of the actual catch of caesionids taken in the Indo-Pacific area.

In the Philippines, fusiliers are landed and consumed on a larger scale than in any other place in the world, both on a per capita basis and in terms of total fisheries production (Table III). They are a common catch component in subsistence and artisanal fisheries and a major focus in specific commercial reef fisheries. Estimates of the relative importance of fusiliers in small-scale fisheries production in the Philippines are generally unreliable because these statistics are difficult to collect. Alcala and Luchavez (1981) however, monitored an artisanal reef fishery in the central Philippines, which averaged overall yields of 8 to over 14 t/km/yr. They found that caesionids are the third-most important group landed out of 13 groups recorded in this fishery. They comprised about 15% of the total catch per year for a total of 0.48 metric tons in a reef area of 1.56 km^2.

The Philippine large-scale muro-ami is the only commercial fishery in the world which focuses on caesionids as a major catch component. This gear relies on up to several hundred swimmers who use a vertical scare-line to drive reef fish into a movable net (Fig. 3). The Philippine commercial muro-ami captures about 17,000 t/yr of caesionids. They are the most important group by weight, and make up approximately 80% of the catch.

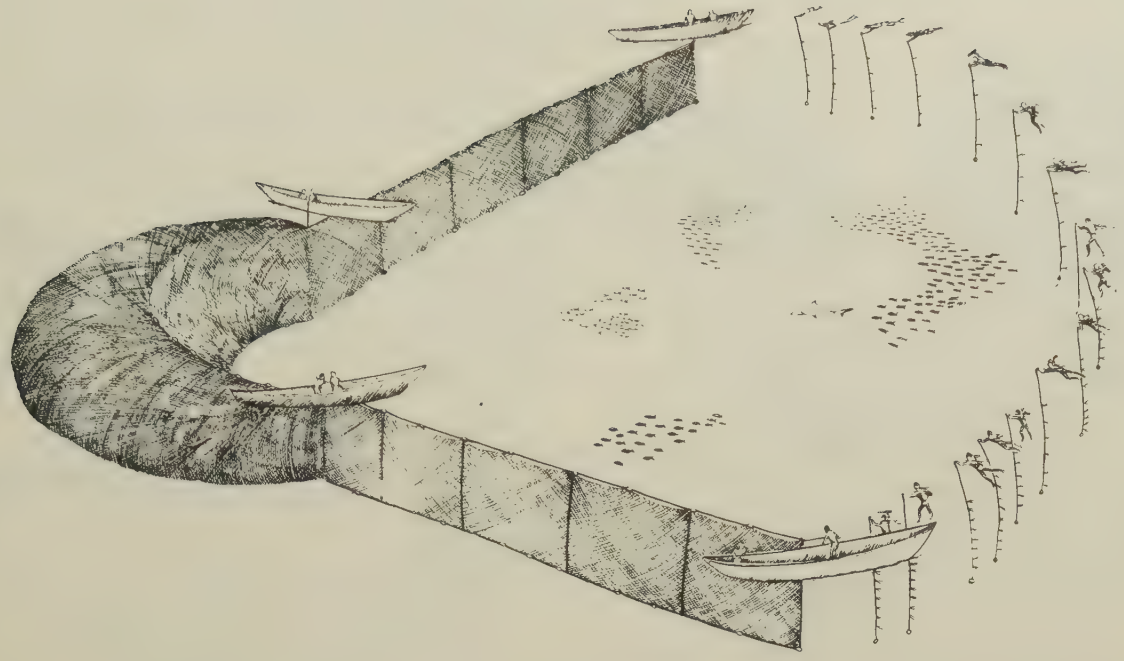


Fig. 3 Muro-ami operation

Caesionids are important baitfishes in many areas where reefs are in proximity to tuna fisheries. This is most notable in oceanic small island systems such as the Laccadive Islands and Maldives in the Indian Ocean and, the Caroline Islands, Marshall Islands, and Fiji in the Pacific. In these areas, the success of the tuna fishery depends on the availability of caesionids and a few other groups of bait fishes. Caesionids are commonly caught by lift nets over the reef flats. These nets are baited by throwing finely minced fish over the net, and lifted when reef fishes gather to feed over it. Some baitfish fusiliers are also captured at night with lights and dip nets. Caesionids survive nicely in bait wells. Juvenile *Caesio*, small *Pterocaesio, Gymnocaesio*, and *Dipterygonotus* are all common as baitfishes.

Where catch statistics are recorded, fusiliers, as well as other reef fishes, appear to be of minor importance in terms of a country's total fisheries production. In the Philippines, where they are fished most heavily, they comprise only about 1% of the recorded total commercial and municipal catch. However, almost 100 groups of fishes and invertebrates contribute to this total production. Fisheries production in the tropics typically depends on diverse resources. In coastal communities that rely on small-scale coral reef fisheries, fusiliers are often an important fisheries component. In these communities, caesionid catches contribute substantially in nutritional and socio-economic terms.

1.3 Illustrated Glossary of Technical Terms and Measurements

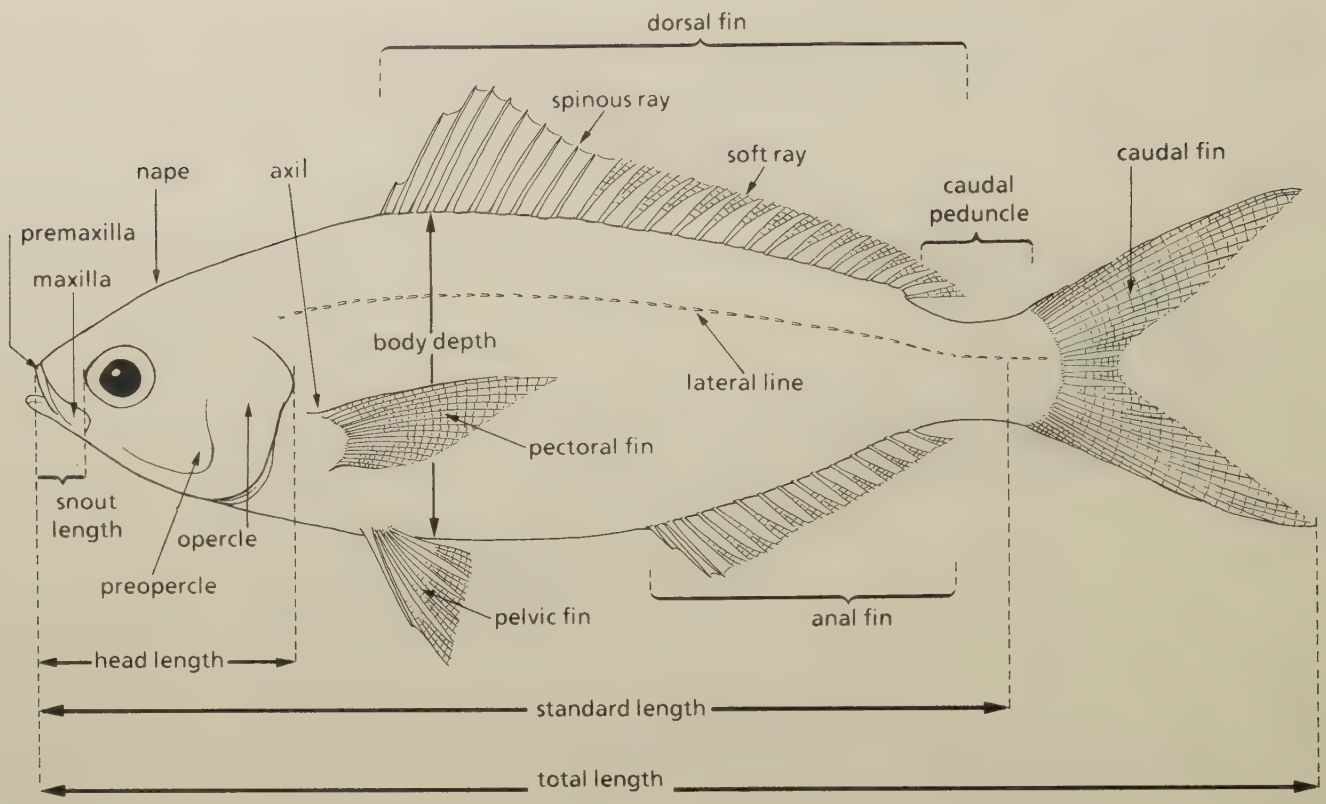
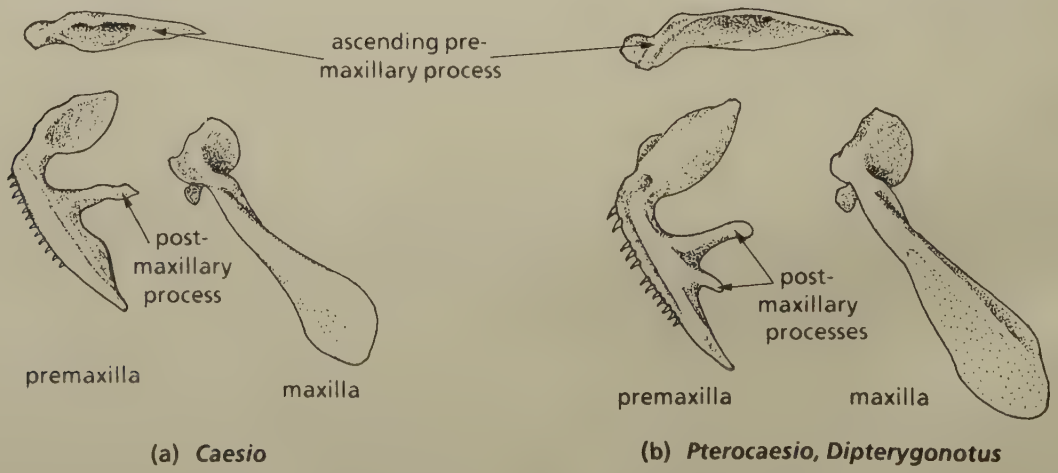


Fig.4 External morphology and measurements

Anterior - Relating to the front portion.

Ascending premaxillary process - A process on each premaxilla at the midline (symphysis) where the two premaxillae meet, extending posteriorly. In caesionids, this is a separate bone from the premaxilla (Fig. 5).



(a) *Caesio* (b) *Pterocaesio, Dipterygonotus*

Fig. 5 Exploded view of upper left side of jaw

Axil - The angular region between the pectoral fin and the body (Fig. 4).

Basioccipital - The true floor of the braincase (Fig. 6)

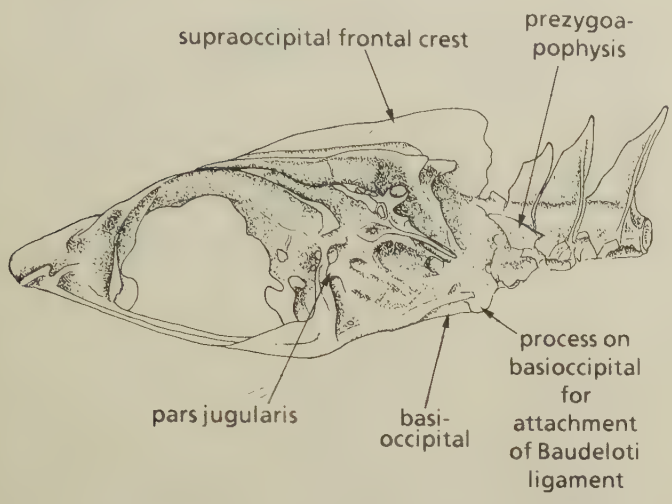


Fig. 6 Skull and anterior vertebrae (Pterocaesio pisang) (lateral view)

Baudelot's ligament - The ligament connecting the basioccipital with the dorsal tip of the cleithrum (a bone in the pectoral girdle).

Canine - Elongate, conical tooth.

Caudal peduncle - The narrow end of the body between the posterior end of the dorsal fin and the base of the caudal fin (Fig. 4).

Cheek scales - Scales on the preopercle. This meristic character is counted as the maximum number of rows on the preopercle, between the eye and the ventral margin of the preopercle (Fig. 7).

Fig. 7 Cheek scales

Ctenoid scales - Scales with small spiny projections on the posterior end (Fig. 8b).

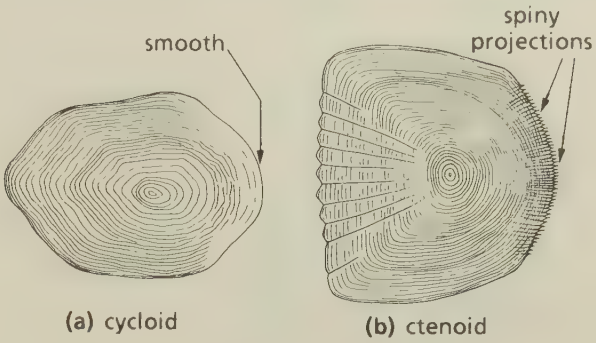


Fig. 8 Scales

Compressed - Flattened from side to side; refers to relative body width.

Condyle - A process on bone for the purpose of articulation, e.g. the condyle on the basioccipital articulates with the first vertebra.

Confluent - Joined together.

Conical - Cone-shaped; refers to teeth.

Cycloid scales - Scales without spiny projections at the posterior end (8a).

Dentary - The tooth-bearing bone of the lower jaw.

Distal - Away from the centre of the body, outward from the point of attachment; the opposite of proximal.

Edentate - Without teeth.

Epibranchial - The second upper element in the branchial arch (Fig. 9).

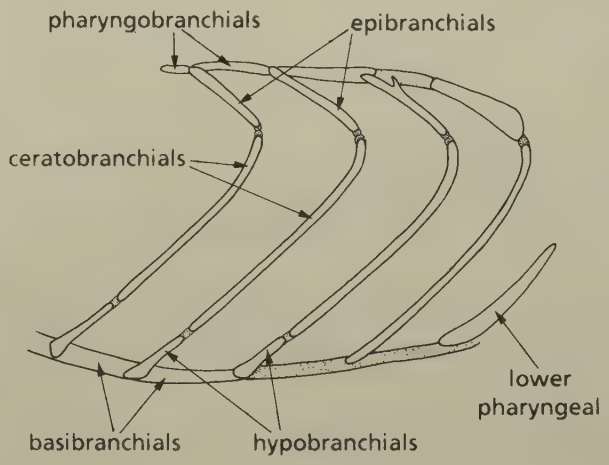


Fig. 9 Bones of branchial arches (schematic)

Epipleural ribs - Bones which attach on the outside upper surface of ribs and project into the muscle of the flanks (Fig. 10).

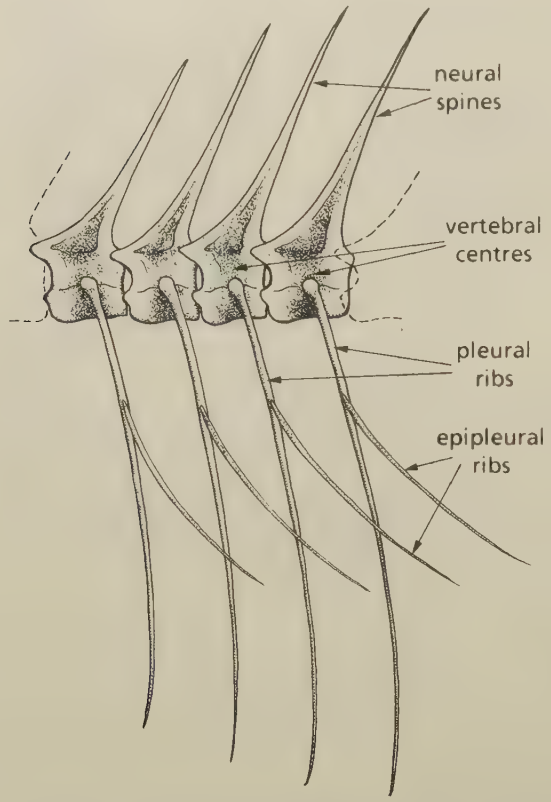


Fig. 10 Thoracic vertebral column with ribs (schematic)

Interorbital space - The region of the head above and between the eyes.

Lateral line - A series of pored or tubed scales forming a raised line along the side of the body (Fig. 11). The lateral-line scales are counted from the most anterior pored scale to the base of the caudal fin which is detected by the crease resulting from folding the fin forward.

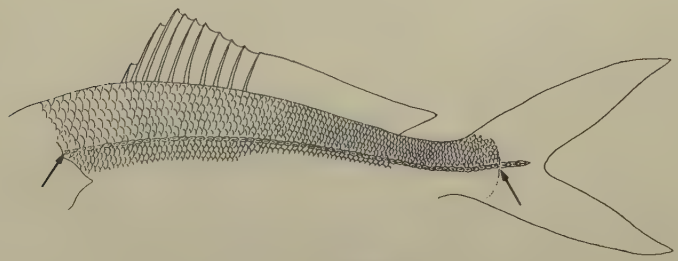


Fig. 11 Lateral line

Maxilla - The bone of the upper jaw lying above the premaxilla (Fig. 5).

Meristic - Divided into parts or discrete units; pertaining to number of parts as in scales or fin rays. Meristic characters include scale counts and fin ray counts.

Nape - The dorsal region of the head where the skull joins the body (Fig. 4).

Opercle margin - The posterior edge of the bone covering the gill region (Fig. 4).

Palatine - Paired bones on the sides of the roof of the mouth on either side of the vomer (Fig. 12).

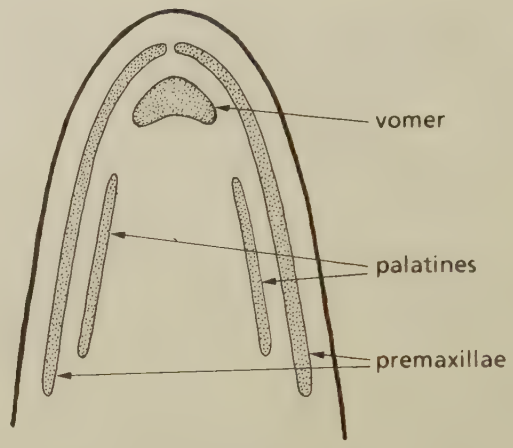


Fig. 12 Vomer and palatine bones on roof of mouth (schematic)

Pars jugularis - A chamber outside and lateral to the braincase which serves as a conduit for nerves and blood vessels connecting the brain. In caesionids, there is one opening to the pars jugularis which faces forward into the eye socket and, from 1 to 4 openings on the lateral side (Fig. 6).

Peduncular scales - Scales found on the caudal peduncle. Upper and lower peduncular scales are circumference scale row counts (rows counted on both right and left sides and including the midline scale row) with the lateral-line row included in the lower peduncular count; these scale rows are counted in the mid-portion of the caudal peduncle (Fig. 13)

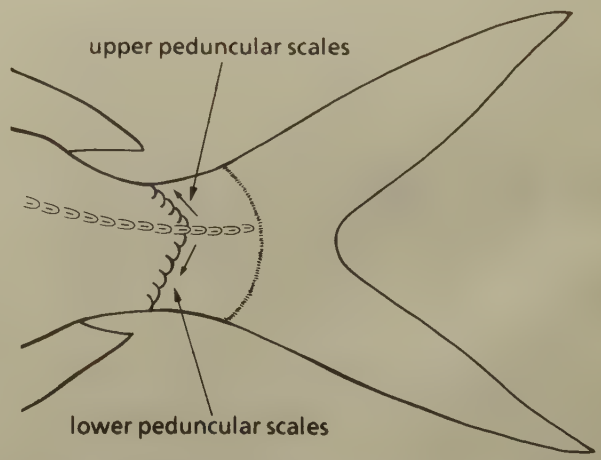


Fig. 13 Scale counts on caudal peduncle

Postmaxillary process - A process located on the side of the premaxilla which points roughly towards the posterior portion of the fish (also called lateral premaxillary process) (Fig. 5).

Posterior - The rear or hind portion.

Predorsal configuration - Refers to the position of the predorsal bones and first dorsal pterygiophores (bones supporting the fin rays) in relation to the neural spines (spines projecting upwards from the vertebrae). The formula for this configuration contain 0's which represent a predorsal bone, slants which represent a neural spine, and numbers which indicate the number of rays supported by pterygiophores (Fig. 14).

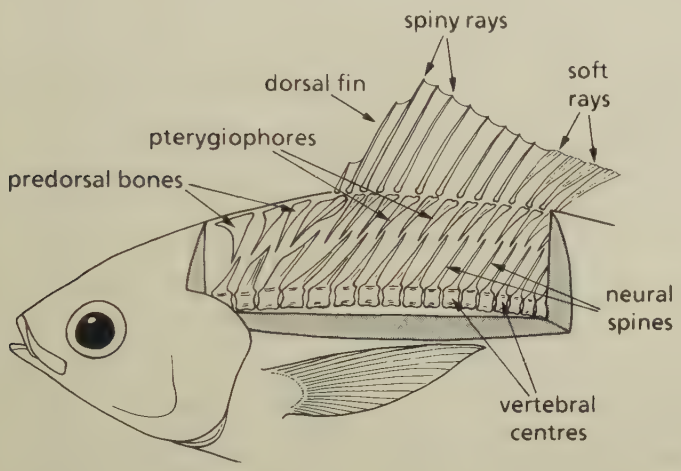


Fig. 14 Schematic representation of predosal bones and dorsal fin supports (i.e. 0/0/0 + 2/1 + 1)

Predorsal scales - The scales on the midline in front of the dorsal fin origin. These scales are counted as the scale rows which intersect the midline from the anterior point of the dorsal fin to the anterior point of the supratemporal band of scales (Fig. 15).

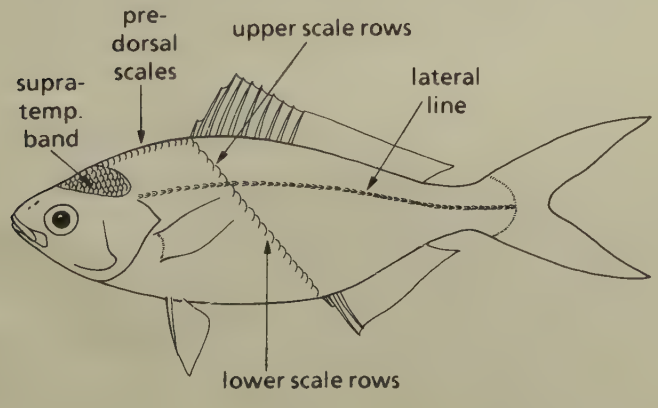


Fig. 15 Predorsal scales and counts of scale rows above and below lateral line

Premaxilla - The anterior bone of the upper jaw (Fig. 5).

Preopercle - Bone on the cheek in front of the opercle and forming the front part of the gill cover (Fig. 4).

Prezygopophysis - The anterior projecting process on the upper portion of the arch of the vertebra (Fig. 6).

Procurrent caudal rays - Short caudal rays on the upper and lower margin of the caudal fin which do not project to the hind margin of the fin (Fig. 16).

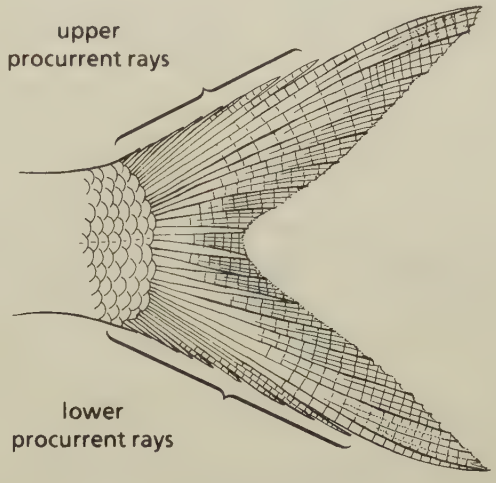


Fig. 16 Caudal fin (*Caesio*)

Proximal - Toward the centre of the body; the opposite of distal.

Pterygiophore - The bone which supports the base of each fin ray (Fig. 14).

Ray - A fin support element; soft rays are segmented and flexible; spinous rays are stiff, unsegmented, and support the anterior portion of the anal and dorsal fins in caesionids.

Scales above and below lateral line - A transverse series of scale rows; below lateral-line scales are counted from the origin of the anal fin, not including the median ventral scale row, along a forward diagonal to the lateral line; above lateral-line scales are counted from the origin of the dorsal fin, not including the median dorsal scale row, on a diagonal backward to the lateral line; the lateral line row is not included in these counts (Fig. 15).

Supraoccipital-frontal crest - On the dorsal surface and centre of the skull, a ridge of bone running longitudinally over the frontal and supraoccipital bones (Fig. 6).

Supratemporal band of scales - A distinct band of scales, roughly "U"-shaped, on the upper head (Figs. 15,17).

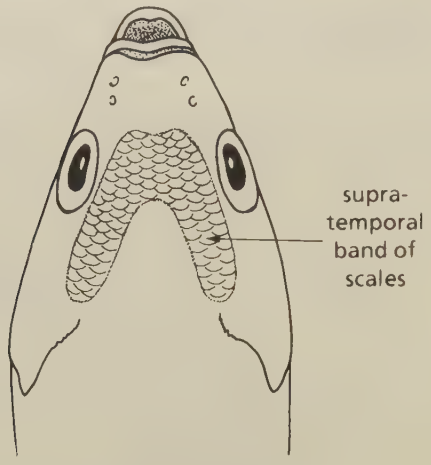


Fig. 17 **Dorsal view of head**

Vomer - A bone forming the middle front part of the roof of the mouth, sometimes bearing teeth (Fig. 12).

2. SYSTEMATIC CATALOGUE

2.1 General Aids to Identification

2.1.1 Diagnostic Features of the Family Caesionidae

Oblong to fusiform, moderately compressed, medium-sized to small lutjanoid fishes. Longitudinal axis from tip of snout to middle of caudal fin passing through centre of eye. Eye moderately large, its diameter longer than snout length. Mouth small and highly protrusible; ascending premaxillary process a separate ossification from premaxilla; ethmo-maxillary ligament absent; 1-2 finger-like postmaxillary processes (Fig. 2a,b); angle of jaw oblique, about 40-50° to horizontal. Dentition variously reduced; small or minute conical teeth; premaxillae, vomer and palatines with or without teeth. Caudal fin deeply forked. Margin of dorsal and anal fins more or less evenly sloping; third or fourth dorsal spines longest; second or third anal spines longest, remaining spines and rays gradually decreasing in length (except in *Dipterygonotus* with dorsal fin profile not evenly sloping, last 4-5 dorsal spines small and nearly separate, connected only at their bases by membrane, and dorsal rays much longer than these spines). Dorsal fin with 10-15 slender weak spines and 8-22 soft rays; anal fin with 3 spines and 9-13 rays; pelvic fins with 1 spine and 5 rays; pectoral fins with 16-24 rays. Branchiostegal rays 7. Scales moderate to small, weakly ctenoid; lateral-line scales 45-88. A separate A1' section of the adductor mandibulae which originates on the subocular shelf. Predorsal configuration 0/0/0 + 2/1 + 1/, /0 + 0/0 + 2/1 + 1/ or /0 + 0/2/1 + 1/ Epipleural ribs 10-15. Procurrent caudal rays typically 7-10. Hypurals 1-2 and 3-4 typically fused in all species (except some juveniles). Openings in external wall of pars jugularis 2-5. **Colour:** Sides with or without longitudinal stripes; caudal fin either without markings, with a blackish blotch on tips of lobes, or with a longitudinal blackish streak in middle of each lobe; axil of pectoral fin black.

2.1.2 Notes on the Identification of Fusiliers

There has been much confusion with species names of caesionids because preserved specimens are difficult to identify. The species of this family are easily distinguished on the basis of their life colours, although these colour patterns usually do not preserve well. The morphological features of caesionids are often difficult to use in identification due to the feebleness of the structures. Scales readily detach, and rays are slender and easily broken; teeth are small and weak and often require staining for proper characterization. When these elements are not broken or detached, they are useful as meristic characters. The overlaps in counts of these characters, however, are such that, based on meristics alone, there is often a possibility of misidentification. For this reason, when life colours are not known, it is better to base identifications on a number of specimens from each population and identify the most frequent meristic counts. Tables IV to VI list the frequency distributions of those characters most useful in the identification of caesionids.

Two keys are provided below for the identification of fusiliers. The first is a laboratory key intended for use with preserved specimens. There are some cases however, where knowledge of colour patterns is necessary for identification when using the laboratory key. Often these patterns are discernible in preserved specimens but it is better if notes on colour pattern have been taken on specimens during collection. If daytime life colour patterns are apparent, caesionids can be easily and reliably identified. For this reason, a second key is provided for use in the field, together with colour plates, as an aid to identification. If caesionids are captured or observed at night, they often assume a reddish, blotched background colour. This can cause some problems in identification but generally, the normal daytime pattern can still be recognized.

2.1.3 Laboratory Key to Species

Note: This key is intended for use with preserved specimens, although in some cases information on colour pattern is necessary or helpful in identification. Characters used here include jaw structure, fin ray counts, scale counts, external morphology, proportional measurements, and markings. The meristic frequency distribution tables (section 2.1.4) will be useful in understanding the variation of most meristic characters used in this key.

1a. A single postmaxillary process; posterior end of maxilla blunt, its greatest depth posterior to end of premaxilla (Fig. 18) .....***Caesio***

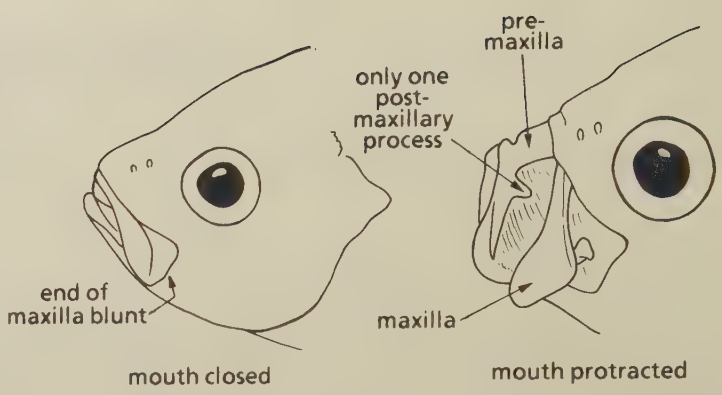
2a. Anal fin usually with 3 spines and 11 soft rays

3a. Dorsal fin usually with 10 spines and 15 soft rays; supratemporal band of scales confluent at dorsal midline (Fig. 19a); caudal fin without any prominent blackish markings (Fig. 20) (eastern Indian Ocean to western Pacific) .....***C. cuning***

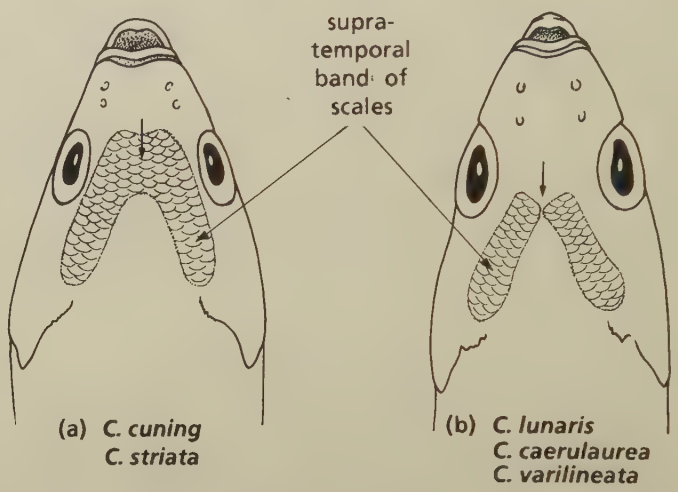
3b. Dorsal fin usually with 10 spines and 14 soft rays; supratemporal band of scales interrupted at dorsal midline by a thin scaleless zone (Fig. 19b); tips of caudal lobes with a blackish blotch (Fig. 21) (Red Sea to western Pacific) .....***C. lunaris***

2b. Anal fin usually with 3 spines and 12 soft rays

4a. Lateral-line scales 51 to 61; upper scale rows on spinous portion of dorsal fin usually oblique (Fig. 22a); caudal fin yellow in life without blackish markings, or partially yellow, the lobe tips with a black blotch bordered by a distinct white proximal band

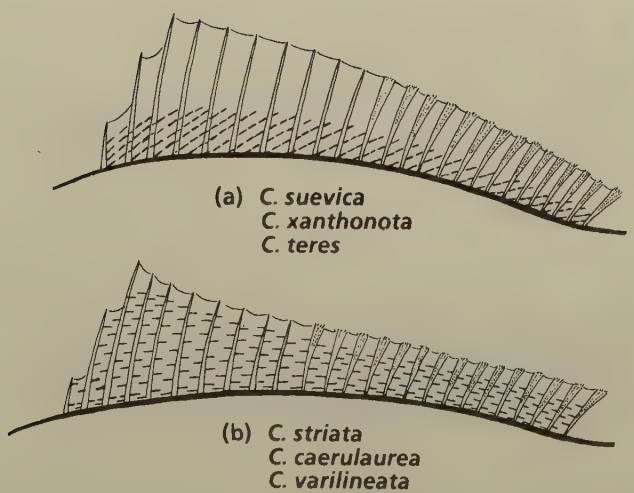


Caesio **Fig. 18**

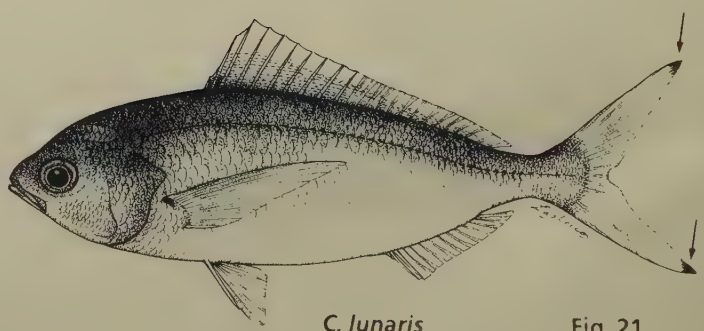


Dorsal view of head **Fig. 19**

C. cuning Fig. 20



Orientation of scales on dorsal fin **Fig. 22**



C. lunaris Fig. 21

5a. Caudal fin partially yellow in life, the lobe tips with a black blotch which has a white proximal border (Fig. 23); dorsal peduncular scales usually 11; ventral peduncular scales 13 to 15; scales below lateral line to anal-fin origin 15 to 17 (Red Sea).....***C. suevica***

5b. Caudal fin yellow in life, without prominent blackish markings; dorsal peduncular scales 11 to 13; ventral peduncular scales 14 to 17; scales below lateral line to anal-fin origin usually 17 to 20 (Indian Ocean to western Pacific, excluding Red Sea)

6a. Body yellow dorsally, blue on side, the demarcation horizontal from interorbital space across upper third of body; predorsal and supratemporal region not considerably darker than dorsal part of caudal peduncle in alcohol-preserved specimens (Fig. 24) (Indian Ocean to Indonesia) .....***C. xanthonota***

6b. Body yellow dorsally, blue on side, the demarcation oblique from slightly anterior to origin of dorsal fin to lower posterior part of caudal peduncle (in western and central Pacific the yellow region in adults is restricted to caudal peduncle); predorsal region, especially supratemporal and interorbital region, dark in alcohol-preserved specimens (Fig. 25) (Indo-Pacific) .....***C. teres***

4b. Lateral-line scales 57 to 67; scale rows on spinous portion of dorsal fin horizontal (Fig. 22b); caudal fin not yellow, each lobe with a median blackish streak or a black blotch lacking a distinct white proximal margin

7a. Pectoral rays 18 or 19, rarely 20; supratemporal band of scales always confluent at dorsal midline (see Fig. 19a); body depth 3.5 to 4.5 (average 4.1) times in standard length (Fig. 26) (Red Sea) .....***C. striata***

7b. Pectoral rays 20 to 22 (rarely 19 except in eastern Africa); supratemporal band of scales often interrupted at dorsal midline by a thin scaleless zone (see Fig. 19b); body depth 3.0 to 4.2 (average 3.5) times in standard length

C.suevica Fig. 23

C.xanthonota Fig. 24

C.teres Fig. 25

C.striata Fig. 26

8a. A single yellow longitudinal stripe in life, directly above the lateral line for most of its length; tip of each caudal lobe not darker than blackish streak within lobe; eye diameter 3.3 to 5.1 (average 3.8) times in head length (Fig. 27) (Indian Ocean to Samoa) .....***C. caerulaurea***

8b. Four to 6 longitudinal yellow stripes on side in life; tip of each caudal lobe with a prominent black blotch which is darker than blackish streak within lobe; eye diameter 3.7 to 5.5 (average 4.7) times in head length (Fig. 28) (Indian Ocean to western Indonesia, including Red Sea and Arabian (Persian) Gulf .....***C. varilineata***

1b. Two postmaxillary processes; posterior end of maxilla tapered, its greatest depth anterior to end of premaxilla (Fig. 29)

9a. Dorsal and anal fins scaled; premaxilla with small conical teeth, sometimes restricted to front of jaw .....***Pterocaesio***

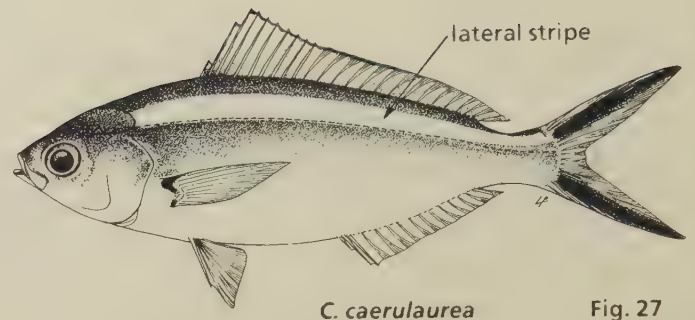
10a. Dorsal fin with 11 or 12 (rarely 10) spines and 19 to 22 soft rays; a blackish streak in each caudal lobe (Fig. 30) (Indo-Pacific) .....***P. tile***

10b. Dorsal fin with 10 or 11 (usually 10) spines and 14 to 16 soft rays; tips of caudal lobes with a black blotch

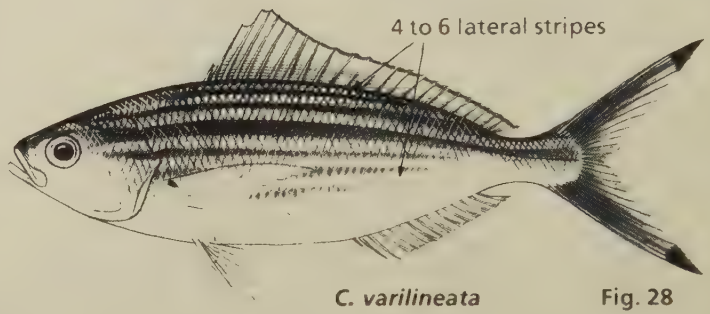
11a. Dorsal peduncular scales usually 11 (rarely 10, 12 or 13); lateral-line scales 62 to 72; pectoral rays 17 to 21 (rarely 22, most frequently 19 or 20); scales above lateral line to dorsal-fin origin usually 8 or 9; scales below lateral line to anal-fin origin usually 13 to 17; side with or without stripes

12a. Pectoral rays usually 19 to 21 (most frequently 20); 3 light and 3 dark stripes on upper, side in life (Fig. 31) (eastern Indian Ocean and western Pacific east to Fiji) .....***P. trilineata***

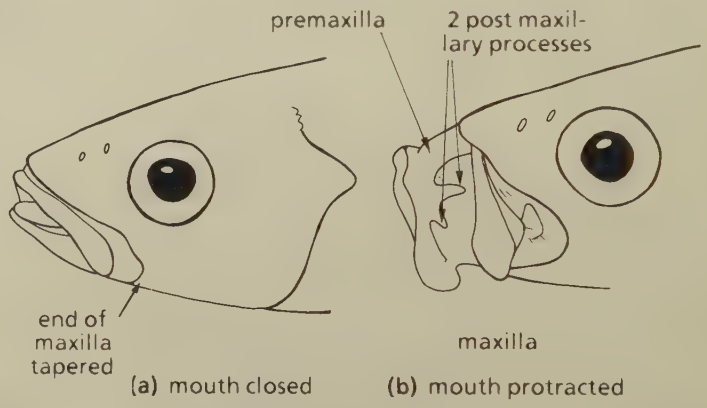
12b Pectoral rays 17 to 20 (most frequently 19); side without stripes or with at most, 2 stripes



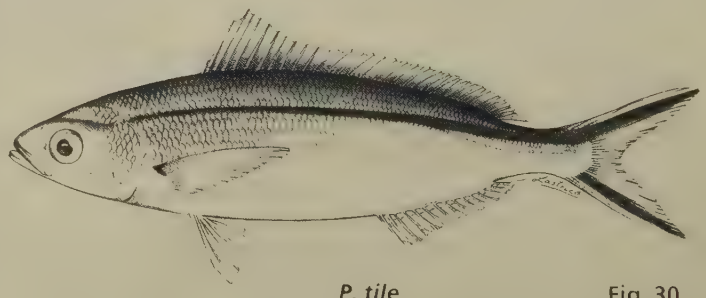
C. caerulaurea Fig. 27



C. varilineata Fig. 28



Pterocaesio, Gymnocaesio, Dipterygonotus Fig. 29



P. tile Fig. 30

P. trilineata Fig. 31

13a. Body without stripes on side, its colour reddish or greenish blue (Fig.32) (Indian Ocean to western Pacific) .....***P. pisang***

13b. Body with 1 or 2 yellow stripes on side in life

14a. A single, thin, yellow stripe in life covering lateral line for most its length, except above lateral line on caudal peduncle (Fig. 33) (western Indian Ocean) .....***P. capricornis***

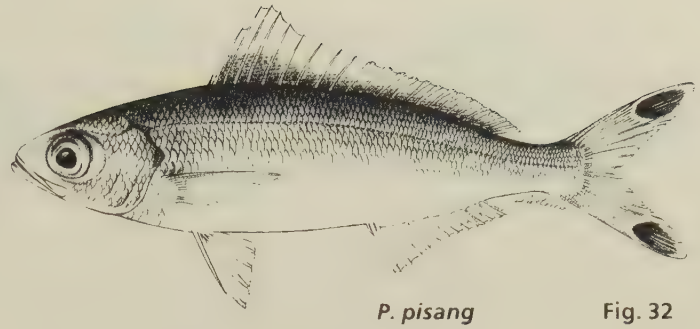
14b. Two yellow stripes on side in life, one on dorsal midline on nape and along base of dorsal fin and the other, which is broader anteriorly, directly below lateral line for most its length, except above lateral line on caudal peduncle (Fig. 34) (Red Sea and Indian Ocean to western Pacific) .....***P. chrysozona***

11b. Dorsal peduncular scales usually 12 or 13 (rarely 11 or 14); lateral-line scales 66 to 88; pectoral rays 20 to 24 (always most frequently 21 or above); scales above lateral line to dorsal-fin origin 9 to 11; scales below lateral line to anal-fin origin usually 16 to 18; side with 1 or more longitudinal stripes or a large yellow blotch

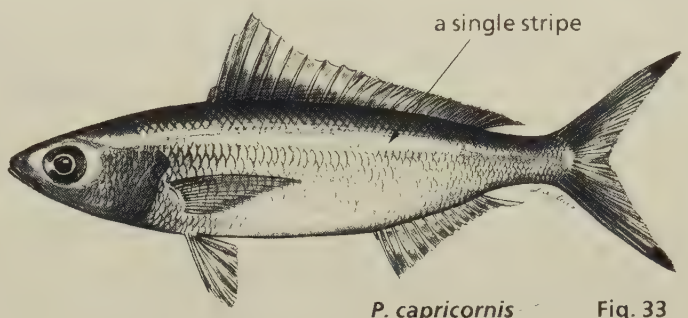
15a. Lateral-line scales 74 to 88; pectoral rays 21 to 23 (most frequently 22); a broad yellow stripe on side in life, wider anteriorly, covering lateral line for most its length (Fig. 35) (Indian Ocean to western Pacific) .....***P. lativittata***

15b. Lateral-line scales 66 to 80; pectoral rays either usually 20 to 22 (most frequently 21) or 22 to 24 (most frequently 23); either a thin yellow stripe on side or a large yellow blotch above pectoral-fin base

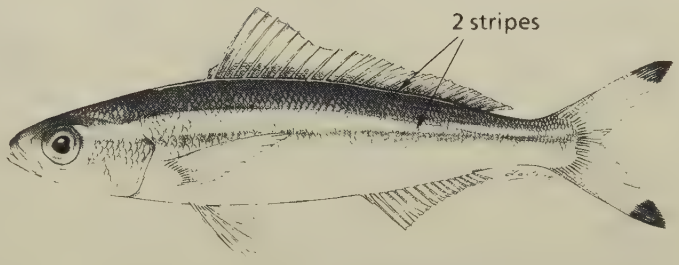
16a. Pectoral rays 22 to 24 (most frequently 23); 2 thin yellow stripes on side, the lower stripe covering the lateral-line for most its length, above lateral line on caudal peduncle, the upper stripe mostly 1 or 2 scales below the dorsal profile of the body (Fig. 36) (Indian Ocean to western Pacific) .....***P. marri***



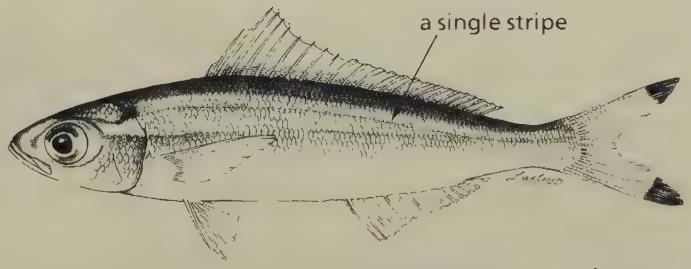
P. pisang Fig. 32



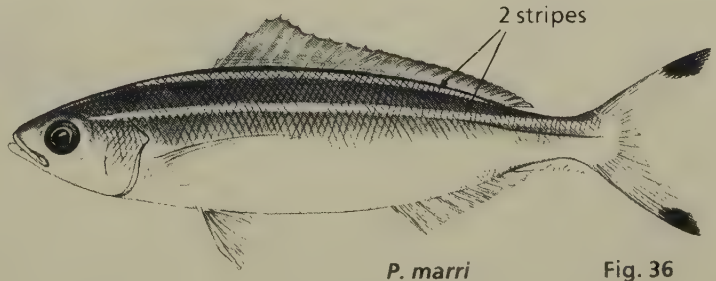
P. capricornis Fig. 33



P. chrysozona Fig. 34



P. lativittata Fig. 35



P. marri Fig. 36

16b. Pectoral rays usually 20 to 22 (most frequently 21); 1 or 2 yellow lines or a large yellow blotch on side (if there are 2 lines, the lower one is distinctly below lateral line for most its length, except on caudal peduncle where it is above lateral line)

17a. A large yellow blotch above pectoral fin in life; no stripes on side (Fig. 37) (eastern Indian Ocean to western Pacific) .....***P. randalli***

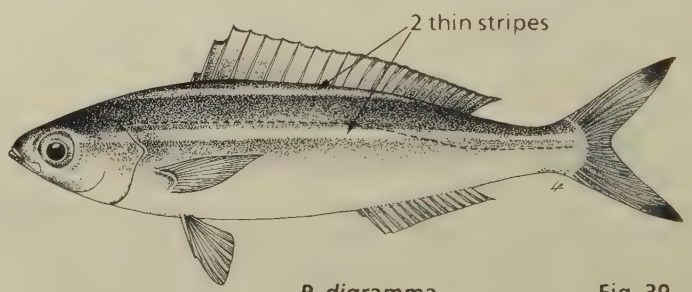
P. randalli Fig. 37

17b. No large yellow blotch above pectoral fin; 1 or 2 yellow stripes on side

18a. A single thin yellow stripe on side covering lateral line for most its length, on caudal peduncle above lateral line (Fig. 38) (eastern Indian Ocean to western Pacific) .....***P. tessellata***

P. tessellata Fig. 38

18b. Two thin longitudinal stripes on side, the lower distinctly below lateral line for most its length, on caudal peduncle above lateral line, the upper following dorsal profile (Fig. 39) (eastern Indian Ocean to western Pacific) .....***P. digramma***



P. digramma Fig. 39

9b. Dorsal and anal fins without scales; premaxilla without teeth

19a. Dorsal fin with 10 or 11 (usually 10) spines and 14 to 16 (usually 15) soft rays, the fin not deeply notched; anal fin with 3 spines and 11 to 13 (usually 12) soft rays; pectoral rays 20 to 22 (Fig. 40) (Red Sea and Indian Ocean to western Pacific) .....***Gymnocaesio gymnoptera***

G. gymnoptera Fig. 40

19b. Dorsal fin with 12 to 15 (usually 14) spines and 8 to 11 (usually 10) soft rays, the fin deeply notched, the last few spines joined only at base by fin membrane; anal fin with 3 spines and 9 to 11 (usually 10) soft rays; pectoral rays 16 to 19 (Fig. 41) (Indian Ocean to western Pacific) ...***Dipterygonotus balteatus***

D. balteatus Fig. 41

2.1.4 Meristic Frequency Distribution Tables

Meristic characters (counts of different morphological elements) have already been used in the preceding key. In caesionids, they overlap considerably. However, a pile of specimens of the same species can be identified very reliably on the basis of the most frequent (modal) counts. Therefore, and as complement to the laboratory key, the 3 following meristic frequency distribution tables (IV, V, VI) are presented as an additional aid to species identification.

TABLE IV

Frequency Distributions of Fin Rays in Caesionidae

	Dorsal spines						Dorsal fin spines												Anal fin rays					Pectoral fin rays								
	10	11	12	13	14	15	8	9	10	11	13	14	15	16	19	20	21	22	9	10	11	12	13	16	17	18	19	20	21	22	23	24
C. cuning	58											3	52	3						1	54	3			6	58	46	6				
C. lunaris	66										3	62	1							1	65					4	40	85	3			
C. suevica	18											2	16									18						18	18			
C. xanthonota	23											1	22								1	22						11	30	5		
C. teres	84											1	80	2								82	2			1	1	42	102	20	1	
C. caerulaurea	72											2	68	2								71	1				5	45	98	39		
C. varilineata	65											2	56	6							2	59	5					21	62	46	1	
C. striata	42											2	38	2								42				21	59	5				
P. tile	3	35	19												7	20	24	6					57							19	72	23
P. digramma	55											2	49	4							1	54						29	73	9	1	
P. chrysozona	95	1										3	90	3							7	87	1		1	17	114	60				
P. pisang	59	1										4	55	1							1	58	1			28	79	12				
P. randalli	23											1	19	3								23						3	30	13		
P. marri	63	1										1	60	3							2	60	1							49	71	7
P. lativittata	37											1	33	3								36	2						20	41	19	
P. capricornis	2												2									2					4					
P. trilineata	78	1										4	70	5							4	75					53	95	10	1		
P. tessellata	71	1										1	69	2							1	70	1					12	77	55		
G. gymnoptera	55	6										7	48	6							2	59	1					9	72	43		
D. balteatus			1	2	54	3	1	6	49	4									7	52	1			1	24	66	28					

TABLE V

Frequency Distributionss of useful Meristic Characters in Caesionidae

	Upper peduncular scales						Lower peduncular scales							Scale rows above lateral line					Scale rows below lateral line								
	9	10	11	12	13	14	12	13	14	15	16	17	18	7	8	9	10	11	12	13	14	15	16	17	18	19	20
C. cuning	42	15	1				1	41	16					1	37	20						20	31	6	1		
C. lunaris	2	25	37		1			5	32	28				2	53	10	1				1	7	8	28	15	6	
C. suevica		1	17					1	6	11				3	9	6						3	7	8			
C. xanthonota			16	7					2	20	1				2	11	9	1						3	10	8	2
C. teres			32	32	16				3	60	16	2		1	39	29	14						1	20	30	22	10
C. caerulaurea		7	58	2					13	55					10	50	9					11	36	19	3		
C. varilineata		4	60	2					4	61					4	48	13					7	30	24	2		
C striata			42	1						39	4				36	6					8	21	13	1		
P. tile			24	28	5					34	19	3	1	15	42						1	4	41	11			
P. digramma			1	11	43	1					11	44	1			7	38	11					4	20	31		1
P. chrysozona			88	6	1				1	85	7	2		4	49	42				5	30	40	16	4			
P. pisang		2	53	5				1	1	56	1	1			29	28	3			2	33	23	2				
P. randalli			5	4	13	1				14	7	2			1	15	7					2	10	10	1		
P. marri				16	45	2				5	20	38				10	42	11				2	23	28	10		
P. lativittata				4	22	6				3	13	16				9	24	2					5	15	8	1	
P. capricornis			2							2					1	1						2				
P. trilineata			75	4					1	74	4	1		1	62	16					11	51	12	4	1		
P. tessellata			11	31	28	2				21	32	19				26	43	3				2	23	36	11		
G. gymnoptera			57	2				6	25	27				15	42	5			5	24	25	4					
D. balteatus			3	7	39	11				9	26	22	3			13	44	3				12	30	15	3		

TABLE VI

Frequency Distribution of Lateral-line Scales in Caesionidae

	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67
C. cuning	1	2	18	30	34	24	7																
C. lunaris	1	2	2	19	42	38	17	4	5														
C. suevica							1	5	6	9	6	7	1	1									
C. xanthonota								2	4	9	11	11	8		1								
C. teres							5	13	16	25	25	25	22	12	12	10	1						
C. caerulaurea													4	13	19	30	31	22	12	5	4		
C. varilineata													1	1	7	15	22	29	28	13	9	3	2
C. striata															7	9	11	20	16	11	7	2	2

	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84-88
P. tile								11	20	31	23	19	6	2	1								
P. digramma					1	5	6	6	15	19	23	14	15	6	2								
P. chrysozona	1	5	17	26	25	42	36	27	6	4	1												
P. pisang		4	10	17	27	24	22	11	3	1													
P. randalli								2	4	2	4	3	4	8	9	2	4	2	1				
P. marri							1	3	11	16	27	30	19	15	4								
P. lativittata													1	10	7	7	7	8	6	7	5	3	11
P. capricornis				1	1	1	1																
P. trilineata	1	6	15	22	37	34	21	17	2	2	1												
P. tessellata					1	1	11	27	31	36	18	12	5	1	1								
G. gymnoptera			1			3	17	24	28	28	15	2	2										
D. balteatus							2	1	10	7	24	20	24	18	7	5		1	1				

2.1.5 Field Key to Species and Colour Plates

Note: This key is intended for use in underwater surveys, market surveys, and for freshly collected specimens. The characters used in this key consist of colour, markings, and readily observable external morphology.

1a. Caudal fin without prominent dark markings

2a. Caudal fin clear to pinkish; body slender and elongate; dorsal fin notched, the last spinous rays shorter than the soft rays (Fig.42) (Indian Ocean to western Pacific) .....***Dipterygonotus balteatus***

2b. Caudal fin yellow; body fairly deep; dorsal fin continuous, the last spinous rays approximately equal in size to the first soft rays

3a. Entire upper third of body, including interorbital region, supratemporal region, upper caudal peduncle, and caudal fin, bright yellow; middle third of body blue (Fig. 43 a,b); supratemporal band of scales interrupted at dorsal midline by a narrow scaleless zone (Fig. 19b) (Indian Ocean to Indonesia) .....***Caesio xanthonota***

3b. Caudal fin, upper caudal peduncle, and sometimes posterior portion of upper body prominently yellow; most of upper body blue or greyish blue, including interorbital, supratemporal and predorsal region; supratemporal band of scales either interrupted by a narrow scaleless zone (Fig. 19b) or, confluent at dorsal midline (Fig. 19a)

4a. Supratemporal band of scales confluent at dorsal midline (Fig. 19a); upper body greyish blue; in freshly caught and live specimens, the skin bordering the lower portion of the supratemporal band of scales, and 2 or 3 short streaks behind eye, dark blue (Fig. 44 a,b) (eastern Indian Ocean to western Pacific) .....***Caesio cuning***

4b. Supratemporal band of scales interrupted at dorsal midline by a narrow, scaleless zone (Fig. 19b); upper body in front of yellow region more or less uniform deep blue (Fig. 45 a,b) (Indo-Pacific) .....***Caesio teres***

PLATE I

Fig. 42 *Dipterygonotus balteatus*, 89 mm SL, Philippines (K. Carpenter)

Fig. 43a *Caesio xanthonota*, 139 mm SL, Maldive Islands (J. Randall)*

Fig. 43b *Caesio xanthonota*, Thailand (J. Randall) underwater photo*

Fig. 44a *Caesio cuning*, 157 mm SL, Sri Lanka (J. Randall)*

Fig. 44b *Caesio cuning*, Great Barrier Reef (J. Randall) underwater photo*

Fig. 45a *Caesio teres*, 239 mm SL, Marshall Islands (J. Randall)*

Fig. 45b *Caesio teres*, Samoa Islands (J. Randall) underwater photo*

* Reproduced from "Indo-Pacific Fishes" No. 15, September 1987, by kind permission of the Editor

1b. Caudal fin with prominent dark markings

5a. A distinct blackish streak within each lobe of caudal fin, the tips of each lobe without a fairly large dark blotch

6a. Four to 6 prominent stripes on side; body slender (Fig. 46 a,b) (Red Sea) ..***Caesio striata***

6b. A single prominent stripe on side; body either fairly deep or slender

7a. Body moderately deep; a single yellow stripe, about 2 or 3 scales wide, directly above lateral line for most of its length, bordered directly above and below by a thin white or light blue zone (Fig. 47 a,b) (juveniles sometimes have a thin black stripe between the yellow stripe and each of the outer whitish zones) (Indian Ocean and Pacific Ocean to Samoa) .....***Caesio caerulaurea***

7b. Body slender; a single blackish stripe, about 1 scale wide, covering the lateral line for most of its length; often a brilliant blue streak anteriorly on sides, below lateral line (Fig. 48 a,b) (Indo-Pacific) ..... ***Pterocaesio tile***

5b. With or without a darkish streak in each caudal lobe (usually without); a prominent dark blotch on tips of each caudal lobe

8a. Body moderately deep; background color of caudal fin yellowish, bluish or dusky; a black triangular patch on upper outside base of pectoral fin

9a. Sides with 3 to 6 yellow stripes which are both above and below the lateral line on side (Fig. 49 a,b) (Indian Ocean to Indonesia, including the Red Sea and Arabian (Persian) Gulf) .....***Caesio varilineata***

9b. Sides without yellow stripes or, with a single stripe above lateral line

PLATE II

Fig. 46a *Caesio striata*, 132 mm SL, Red Sea (J.Randall)*

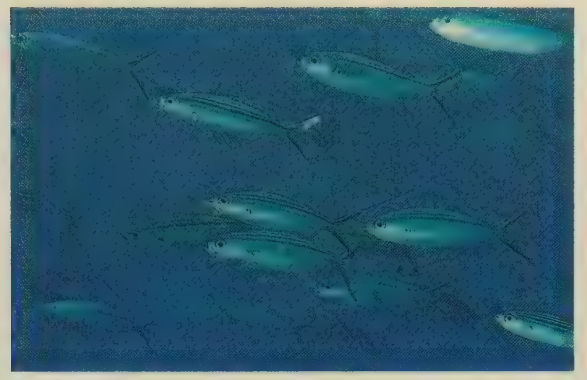


Fig. 46b *Caesio striata*, Red Sea (J. Randall) underwater photo*

Fig. 47a *Caesio caerulaurea*, 208 mm SL, Solomon Islands (J. Randall)*

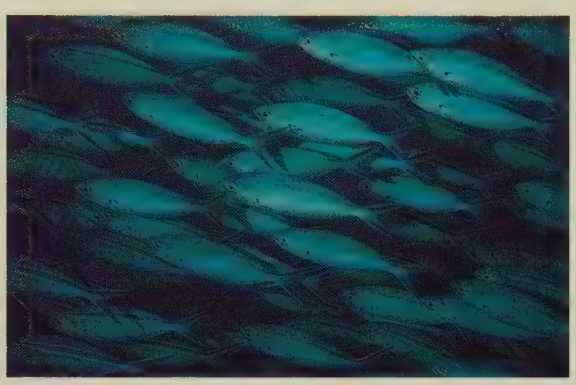


Fig. 47b *Caesio caerulaurea*, Marshall Isls. (J. Randall) underwater photo*

Fig. 48a *Pterocaesio tile*, 172 mm SL, Marshall Islands (J. Randall)*

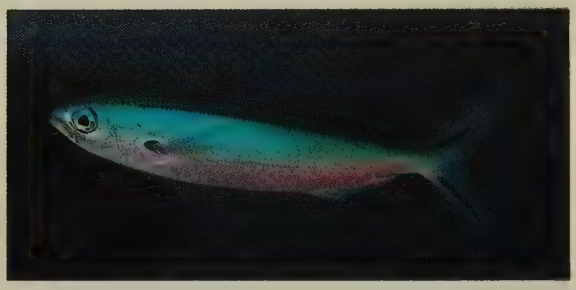


Fig. 48b *Pterocaesio tile*, Philippines (J. Randall) underwater photo*

Fig. 49a *Caesio varilineata*, holotype, 172 mm SL, Arabian (Persian) Gulf (J. Randall)*

Fig. 49b *Caesio varilineata*, Arabian (Persian) Gulf (J. Randall) underwater photo*

Reproduced from "Indo-Pacific Fishes" No. 15, September 1987, by kind permission of the Editor

10a. The dark blotch on tips of caudal lobes bordered anteriorly by a white band; sides with a single yellow stripe, between lateral line and base of dorsal fin, its anterior origin below dorsal fin and extending to caudal fin (Fig. 50 a,b) (Red Sea) ..... ***Caesio suevica***

10b. The dark blotch on tips of caudal lobes not bordered anteriorly by a white band; sides without distinct yellow stripes (Fig. 51 a,b) (Indian Ocean to western Pacific) ..... ***Caesio lunaris***

8b. Body elongate, not very deep; background colour of caudal fin light bluish to pinkish; no triangular black patch on upper outside base of pectoral fin (although pectoral axil is black)

11a. Sides without any prominent dark or yellow stripes or blotches, although lateral line darker than adjacent scales (Fig. 52 a,b) (Indian Ocean to western Pacific) ..... ***Pterocaesio pisang***

11b. Sides with one or more prominent dark or yellow stripes or blotches, in addition to the generally darker lateral line

12a. Sides with a single yellow blotch on sides behind eye and above pectoral fin, 6 or 7 scales wide, above pectoral fin and tapering anteriorly and posteriorly; no stripes on sides (Fig. 53 a,b) (eastern Indian Ocean to western Pacific) ..... ***Pterocaesio randalli***

PLATE III

Fig. 50a *Caesio suevica*, 178 mm SL, Red Sea (J. Randall)*

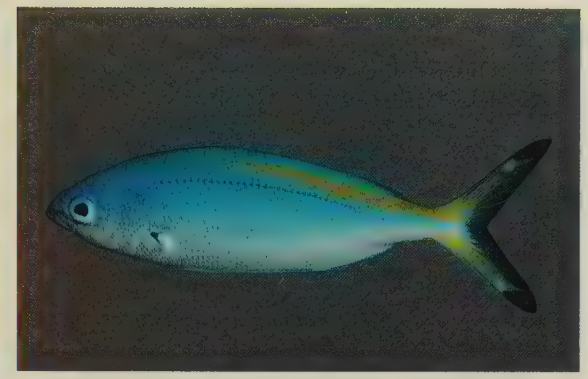


Fig. 50b *Caesio suevica*, Red Sea (J. Randall) underwater photo*

Fig. 51a *Caesio lunaris*, 260 mm SL, Arabian (Persian) Gulf (J. Randall)*

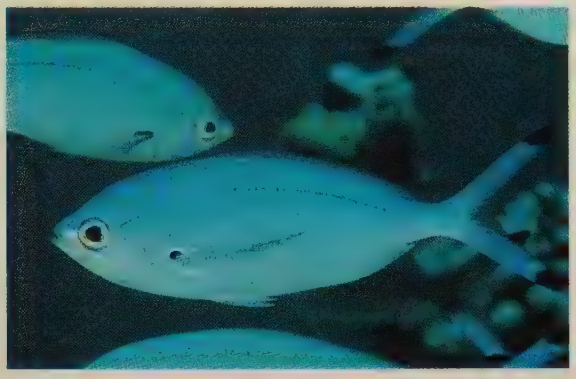


Fig. 51b *Caesio lunaris*, Red Sea (J. Randall) underwater photo*

Fig. 52a *Pterocaesio pisang*, 107 mm SL, Solomon Islands (J. Randall)*

Fig. 52b. *Pterocaesio pisang*, Philippines (K. Carpenter) underwater photo*

Fig. 53a *Pterocaesio randalli*, paratype, 114 mm SL, Philippines (J. Randall)*

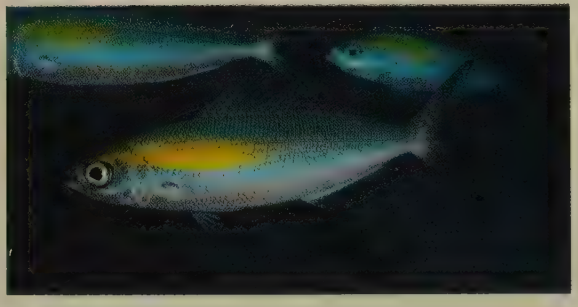


Fig. 53b *Pterocaesio randalli*, Thailand (J. Randall) underwater photo*

Reproduced from "Indo-Pacific Fishes" No. 15, September 1987, by kind permission of the Editor

12b. One or more yellow or dark stripes on sides

13a. A single prominent yellow stripe on side; sometimes an additional yellow stripe along base of dorsal fin

14a. The prominent single stripe on side noticeably broader anteriorly

15a. The prominent stripe on side about 2 scales wide anteriorly, tapering to 1 scale wide; the stripe directly below lateral line for most of its length, except on caudal peduncle where it runs above the lateral line (Fig. 54 a,b) (Indian Ocean to western Pacific) .....***Pterocaesio chrysozona***

15b. The prominent stripe on side 3 to 5 scales wide anteriorly, tapering to 1 scale wide on caudal peduncle; the stripe straddles the lateral line for most of its length so that at least part of the yellow is always above the lateral line (Fig. 55) (eastern Indian Ocean to western Pacific) ..... ***Pterocaesio lativittata***

14b, The single stripe on side not noticeably broader anteriorly

16a. Body very slender, fusiform and elongate; upper sides dark bluish green, with a single yellow stripe, about 1 scale wide, covering lateral line for most of its length except above the lateral line on the caudal peduncle; sides below lateral line sometimes with a bright blue streak anteriorly; dorsal and anal fins without scales (Fig. 56) (Indian Ocean and western Pacific) .....***Gymnocaesio gymnoptera***

16b. Body not very slender, but fusiform and elongate; upper sides light bluish grey, with a single yellow stripe, about 1 scale wide, covering lateral line for most of its length, except above the lateral line on the caudal peduncle; sides below lateral line without a bright blue streak anteriorly; dorsal and anal fins with scales

17a. (Fig. 57) (western Indian Ocean) ..***Pterocaesio capricornis***

PLATE IV

Fig. 54a *Pterocaesio chrysozona*, 105 mm SL, Indonesia (J. Randall)*

Fig. 54b *Pterocaesio chrysozona*, Sri Lanka (J. Randall) underwater photo*

Fig. 55 *Pterocaesio lativittata*, holotype, 104.5 mm SL, Cocos-Keeling Islands (W. Smith-Vaniz)*

Fig. 56 *Gymnocaesio gymnoptera*, 112 mm SL, Solomon Islands (J. Randall)*

Fig. 57 *Pterocaesio capricornis*, drawing by P. Lastrico

Reproduced from "Indo-Pacific Fishes" No. 15, September 1987, by kind permission of the Editor

17.b. (Fig. 58 a,b) (eastern Indian Ocean to western Pacific) ... .***Pterocaesio tessellata***

13b. Two or more prominent yellow or dark stripes on sides

18a. Upper sides with three alternating whitish and, dark or yellowish stripes, lowest stripe about 2 scales wide(Fig. 59 a,b) (eastern Indian Ocean to western Pacific.....***Pterocaesio trilineata***

18b. Upper sides with 2 stripes, each about 1 scale wide

19a. The lower stripe covers lateral line for most of its length, on caudal peduncle it is above lateral line (Fig. 60 a,b) (Indo-Pacific) ..... ***Pterocaesio marri***

19b. The lower stripe about 1 scale below lateral line for most of its length, on caudal peduncle it is above lateral line (Fig. 61) (eastern Indian Ocean to western Pacific) ...***Pterocaesio digramma***

PLATE V

Fig. 58a *Pterocaesio tessellata*, holotype, 104 mm SL, Philippines (J.Randall)*

Fig. 58b *Pterocaesio tessellata*, Philippines (K. Carpenter) underwater photo*

Fig. 59a *Pterocaesio trilineata*, holotype, 99.4 mm SL, Fiji (R. Winterbottom and A. Emery)*

Fig. 59b *Pterocaesio trilineata*, Great Barrier Reef (J. Randall) underwater photo*

Fig. 60a *Pterocaesio marri*, 192 mm SL, Marshall Islands (J. Randall)*

Fig. 60b *Pterocaesio marri*, Marshall Islands (J. Randall) underwater photo*

Fig. 61 *Pterocaesio digramma*, 230 mm TL, Philippines, underwater photo*

Reproduced from "Indo-Pacific Fishes" No. 15, September 1987, by kind permission of the Editor

2.2 Information by Species

Caesio Lacepède, 1801 | **CAES Caes**

Genus: ***Caesio*** Lacepède, 1801:85. Type species, ***Caesio caerulaurea*** Lacepède, 1801, by subsequent designation (Bleeker, 1876).

Synonyms: Genus ***Odontonectes*** Günther, 1859.

Diagnostic Features: Body fairly high to fusiform and elongate, and moderately compressed. A single postmaxillary process; posterior end of maxilla blunt, its greatest depth posterior to end of premaxilla; small, conical teeth on jaws, vomer, and palatines; interorbital space convex; margin of opercle with a pronounced dorsoposterior flap. Dorsal fin continuous, with 10 spines, all broadly connected by membranes, and 13 to 16 soft rays; anal fin with 3 spines and 10 to 13 soft rays; pectoral fin with 17 to 23 rays; procurrent caudal rays typically 9 or 10. Scales weakly ctenoid; scales on dorsal and anal fins; scales in lateral line 45 to 67; upper peduncular scale rows 9 to 13, lower peduncular scale rows 12 to 17; scale rows above lateral line to origin of dorsal fin 7 to 11; scale rows below lateral line to origin of anal fin 14 to 20; supratemporal bands of scales distinct, confluent at dorsal midline or interrupted by a thin scaleless zone. Predorsal configuration 0/0/0 + 2/1 + 1/. Epipleural ribs 10 to 14, without flattened projections on first or second epipleural. Anterior profile of first anal pterygiophore strongly convex distally. Colour markings: side with or without longitudinal stripes; caudal fin either without markings, with a blackish blotch on tips of lobes, or with a longitudinal blackish streak in the middle of each lobe.

Biology, Habitat and Distribution: The species of this genus inhabit Indo-West Pacific coastal areas, primarily on coral reefs. They are schooling fishes which are often found in mixed-species schools. They feed on zooplankton in midwater aggregations. From what is known of the few species studied, reproduction is characterized by early sexual maturity, high fecundity, small pelagic eggs, spawning prolonged throughout most of the year, and mass spawning on a lunar cycle.

Interest to Fisheries: Of minor to moderate importance to coastal fisheries. Caught by drive-in nets, gill nets, traps, trawls, and handlines. Marketed fresh or dried-salted. Juveniles of some species are important as tuna baitfish.

Species: There are 8 species in 3 subgenera: ***Caesio (Odontonectes) cuning, C. (O.) lunaris, C. (Flavicaesio) suevica, C. (F.) teres, C. (F.) xanthonota, C. (Caesio) caerulaurea, C. (C.) varilineata,*** and ***C. (C.) striata.***

Caesio caerulaurea Lacepède, 1801 | **CAES Caes 1**

Caesio caerulaureus Lacepède, 1801, Hist.Nat.Poiss., 3:85 (Moluccas).

Synonyms: ***Smaris mauritianus*** Quoy & Gaimard, 1824; ***Caesio azuraureus*** Rüppell, 1830; ***Caesio maculatus*** Cuvier in C. & V., 1830; ***Caesio nori*** Thiollière, 1856.

FAO Names: **En** - Blue-and-gold fusilier; **Fr** - Caesio azuror; **Sp** - Fusilero azur.

See also page 27, plate II, Figs 47a,b

Diagnostic Features: Body moderately deep, fusiform, elongate and moderately compressed. Ratio of eye diameter to head length usually around 3.4 to 4.2; a single postmaxillary process; small conical teeth in jaws, vomer and palatines. Dorsal fin with 10 spines and 15 (rarely 14 or 16) soft rays; anal fin with 3 spines and 12 (rarely 13) soft rays; pectoral fin with 20 to 22 (rarely 19) rays. Scales in lateral line 57 to 65 (most frequently around 61); upper peduncular scale rows usually 11, lower peduncular scale rows usually 15; scale rows above lateral line to origin of dorsal fin 8 to 10 (most frequently 9); scale rows below lateral line to origin of anal fin usually 15 to 17; scale rows on cheek usually 4; predorsal scales usually 22 to 25; dorsal and anal fins scaled, the spinous part of the dorsal with about 3/4 of its greatest height covered with scales; supratemporal bands of scales often interrupted at dorsal midline by a scaleless zone, always a 'v' shaped scaleless zone anteriorly at midline intruding between the supratemporal band of scales. **Colour**: upper body bluish, lower body white to pale bluish; a single yellow stripe directly above the lateral line except on caudal peduncle where it is about 1 scale above lateral line, the yellow stripe 2 or 3 scales wide, bordered directly above and below by a white or light blue stripe which is about 1 scale wide (juveniles sometimes have another black stripe between the yellow stripe and each of the whitish outer stripes); caudal lobes with a black median streak, the tips not markedly darker than the streak; outer margin of each caudal lobe often bordered in white, and inner margins pale; pectoral, pelvic, and anal fins white; axil of pectoral fin black, and a black triangular patch on outside upper base; dorsal fin light blue to pale with a black distal border.

Geographical Distribution: Widespread in the tropical Indo-West Pacific, from East Africa, including the Red Sea but not the Arabian (Persian) Gulf, to Samoa; north to southern Japan and south to Mauritius and New Caledonia.

Habitat and Biology: Inhabits coastal areas, primarily around coral reefs. A schooling fish which feeds on zooplankton in large midwater aggregations. Commonly schools together with ***C. varilineata***, ***C. striata***, and ***Pterocaesio tile***.

Size: Maximum size to about 35 cm.

Interest to Fisheries: Moderately important in coastal fisheries. This species is common in markets in Indonesia and the Philippines. Caught by drive-in nets, gill nets, traps, trawls and handlines. Marketed fresh and sometimes dried-salted. Juveniles are important as tuna baitfish in some areas.

Local Names: CAROLINE ISLANDS: Duri, Ikonid, Tinika, Tinipu; INDONESIA: Pisang-pisang, Bawang; JAPAN: Sasamuro; LACCADIVE ARCHIPELAGO: Dongio mas; PAPUA NEW GUINEA: Kibiri, Vaber-vaber, Gowana; PHILIPPINES: Baranti (Ilokano), Dalagang bukid (Tagalog), Sulid (Visayan); THAILAND: Pla lerng prong mor.

Literature: Masuda et al. (1975); Schroeder (1980); Fischer & Bianchi (eds.) (1984); Gloerfelt-Tarp & Kailola (1984); Shen (1984); Carpenter (1987).

Caesio cuning (Bloch, 1791)

CAES Caes 2

Sparus cuning Bloch, 1791, Naturg.Ausländ.Fische, 5:31, pl.263 (Indonesia).

Synonyms: ***Cichla cuning*** Schneider (1801); ***Caesio erythrogaster*** Cuvier [Kuhl & van Hasselt, ms] in C. & V., 1830; ***Caesio erythrochilurus*** Fowler, 1904.

FAO Names: **En** - Redbelly yellowtail fusilier; **Fr** - Caesio à ventre rouge; **Sp** - Fusilero vientre colorado.

See also page 25, plate I, Figs 44 a,b

Diagnostic Features: Body fairly deep and compressed. A single postmaxillary process; small, conical teeth in jaws, vomer and palatines. Dorsal fin with 10 spines and 15 (rarely 14 or 16) soft rays; anal fin with 3 spines and 11 (rarely 10 or 12) soft rays; pectoral fin with 18 or 19 (rarely 17 or 20) rays. Scales in lateral line 45 to 51 (most frequently 49); upper peduncular scale rows usually 9 or 10, lower peduncular scale rows usually 13 or 14; scale rows above lateral line to origin of dorsal fin usually 8 or 9; scale rows below lateral line to origin of anal fin usually 15 to 17; 4 or 5 scale rows on cheek; predorsal scales usually 21 to 25; dorsal and anal fins scaled, the spinous part of the dorsal with about 1/2 of its greatest height covered with scales; supratemporal band of scales confluent at dorsal midline. **Colour:** caudal fin, upper caudal peduncle and posterior portion of back yellow; upper body, where not yellow, greyish blue; lower sides and belly white or pinkish; pectoral, pelvic, and anal fins white to pink; axil and upper base of pectoral fin black; dorsal fin yellow posteriorly and greyish blue anteriorly.

Geographical Distribution: Tropical eastern Indian Ocean to western Pacific, from Sri Lanka to Vanuatu (New Hebrides), and from southern Japan to northwestern and northeastern Australia.

Habitat and Biology: Inhabits coastal areas, usually over rocky and coral reefs to depths of around 60 m. Of all the caesionids, ***C. cuning*** appears most tolerant of murky water; it is usually the most abundant caesionid in reef areas characterized by low underwater visibility. This species ranges widely between reefs as it is often captured by trawl net over soft bottom. A schooling fish, found in small to large aggregations. Feeds primarily on zooplankton in midwater.

Size: In most areas throughout its range, maximum total length to about 50 cm; in Sri Lanka it grows to an unusually large size, and often attains a total length of about 60 cm.

Interest to Fisheries: A moderately important foodfish in many areas. It is common in markets in Sri Lanka, where it is taken primarily by handline; western Thailand and Malaysia, where it is caught mostly by fish traps; the Gulf of Thailand, where it is caught in trawls; Indonesia, the Philippines and Papua New Guinea by a variety of methods including drive-in nets, fish traps and gill nets. Marketed mostly fresh.

Local Names: INDIA: Cul kilchi (Tamil); INDONESIA: Ekor kuning, Lapi; JAPAN: Yume-umeiro; PAPUA NEW GUINEA: Cavi, Kera; PHILIPPINES: Biluson (Visayan), Dalagang-bukid lapad (Tagalog), Yellow-tail fusilier (English); THAILAND: Pla hang luang; VIETNAM: Cá cham bi.

Literature: Masuda et al. (as ***C. erythrogaster***) (1975); Schroeder (as ***C. erythrogaster***) (1980); Fischer & Bianchi (eds.) (1984); Gloerfelt-Tarp & Kailola (1984); Carpenter (1987).

Remarks: ***C. cuning*** has often incorrectly been referred to in the literature as ***C. erythrogaster***.

Caesio lunaris Cuvier, 1830

CAES Caes 3

Caesio lunaris Cuvier [Ehrenberg, ms] in C. & V., 1830, Hist.Nat.Poiss., 6:441 (New Ireland).

Synonyms: None.

FAO Names: **En** - Lunar fusilier; **Fr** - Caesio à croissant; **Sp** - Fusilero luna.

See also page 29, plate III, Figs 51a,b

Diagnostic Features: Body fairly deep, fusiform, and moderately compressed. A single postmaxillary process; small conical teeth in jaws, vomer and palatines. Dorsal fin with 10 spines and 14 (rarely 13 or 15) soft rays; anal fin with 3 spines and 11 (rarely 10) soft rays; pectoral fin with 19 or 20 (rarely 18 or 21) rays. Scales in lateral line 45 to 53 (most frequently 49); upper peduncular scale rows usually 10 or 11, lower peduncular scale rows usually 14 or 15; scales above lateral line to origin of dorsal fin usually 8 or 9; scale rows below lateral line to origin of anal fin usually 15 to 19; usually 4 scale rows on cheek; predorsal scales usually 20 to 23; dorsal and anal fins scaled, the dorsal with about 3/4 of the greatest height of spinous part covered with scales; supratemporal band of scales generally interrupted at dorsal midline by a narrow scaleless zone. **Colour**: body bluish, belly paler than upper sides; tips of caudal lobes, axil and upper base of pectoral fin black; caudal fin blue (except in Arabian (Persian) Gulf adults and in juveniles, where caudal fin and portions of caudal peduncle are often yellow); pectoral, pelvic and anal fins white to pale blue; dorsal fin bluish.

Geographical Distribution: Widespread in the Indo-West Pacific, from East Africa, including the Red Sea and the Arabian (Persian) Gulf, to southern Japan and the Solomon Islands.

Habitat and Biology: Found in coastal areas, mainly on or near coral reefs. Feeds on zooplankton in large aggregations. Unlike most other caesionids, this species changes colour during development. In the juvenile stage, it stays close to the reef and schools with juveniles of other caesionids, commonly with ***C. cuning.*** During this stage, it typically has a yellow caudal fin and peduncle. The adults typically feed a little further off the reef than other fusiliers, in deep, clear water, returning to the reef only at night to shelter. Adults loose the yellow coloration, perhaps because it is conspicuous in clear, deep water. In the Arabian (Persian) Gulf however, where water near reefs is generally shallow and murky, this species retains the yellow caudal colouration as adults.

Size: Maximum size to about 40 cm.

Interest to Fisheries: Of minor importance to fisheries in most areas. Caught primarily by drive-in nets, seines and fishtraps. Marketed mostly fresh.

Local Names: JAPAN: Hana-takasagu; INDONESIA: Pisang-pisang; MALAYSIA: Delah; PHILIPPINES: Dalagang-bukid (Tagalog), Moon caesio (English), Morong (Tagalog), Sinao-an (Visayan), Sulid (Visayan).

Literature: Masuda et ,al. (1975); Fischer & Bianchi (eds.) (1984); Gloerfelt-Tarp & Kailola (1984); Randall (1983); Carpenter (1987)

Caesio striata Rüppell, 1830

CAES Caes 4

Caesio striatus Rüppell, 1830, Fische des Rothen Meers, 131, pl.34 (Massawa, Red Sea).

Synonyms: None.

FAO Names: **En** - Striated fusilier; **Fr** - Fusilier strié; **Sp** - Fusilero estriado.

See also page 27, plate II, Figs 46a,b

Diagnostic Features: Body fusiform, elongate, and moderately compressed. A single postmaxillary process; small, conical teeth in jaws, vomer and palatines. Dorsal fin with 10 spines and 15 (rarely 14 or 16) soft rays; anal fin with 3 spines and 12 soft rays; pectoral fin with 18 to 20 rays. Scales in lateral line 59 to 67 (most frequently 62); upper peduncular scale rows usually 11, lower peduncular scale rows usually 15; scale rows above lateral line to origin of dorsal fin 8 or 9; scale rows below lateral line to origin of anal fin usually 14 to 16; usually 4 scale rows on cheek; predorsal scales usually 22 to 25; dorsal and anal fins scaled, the dorsal with about 3/5 of the greatest height of its spinous part covered with scales; supratemporal band of scales confluent at dorsal midline. **Colour:** upper body light bluish to greenish, lower body white; 4 narrow black longitudinal stripes on upper side; upper caudal peduncle and posterior portion of body with a yellow stripe between the 2 black stripes above lateral line; caudal fin with a black streak within each lobe, the tips of lobes with a small black blotch; outer margin of each caudal lobe often bordered in white, the inner margin pale; pectoral, pelvic, and anal fins white; axil of pectoral fin black, a black triangular patch on upper base of pectoral fin; dorsal fin light blue to white.

Geographical Distribution: Restricted to the Red Sea.

Habitat and Biology: Inhabits coastal areas, primarily around coral reefs. Feeds on zooplankton in midwater aggregations. A schooling fish, sometimes in groups together with ***C. caerulaurea***, ***C. varilineata***, and ***Gymnocaesio gymnoptera***.

Size: This species reaches a size of about 25 cm, which is the smallest maximum size of members of the genus ***Caesio***.

Interest to Fisheries: Of very minor importance to coastal fisheries. Occasionally caught by gill nets, traps and handlines.

Local Names: Unavailable

Literature: Randall (1983); Fischer & Bianchi (eds) (1984); Carpenter (1987).

Caesio suevica Klunzinger, 1884

CAES Caes 5

Caesio suevicus Klunzinger, 1884, Die Fische des Rothen Meeres, p.46, pl.5, fig.2 (Red Sea).

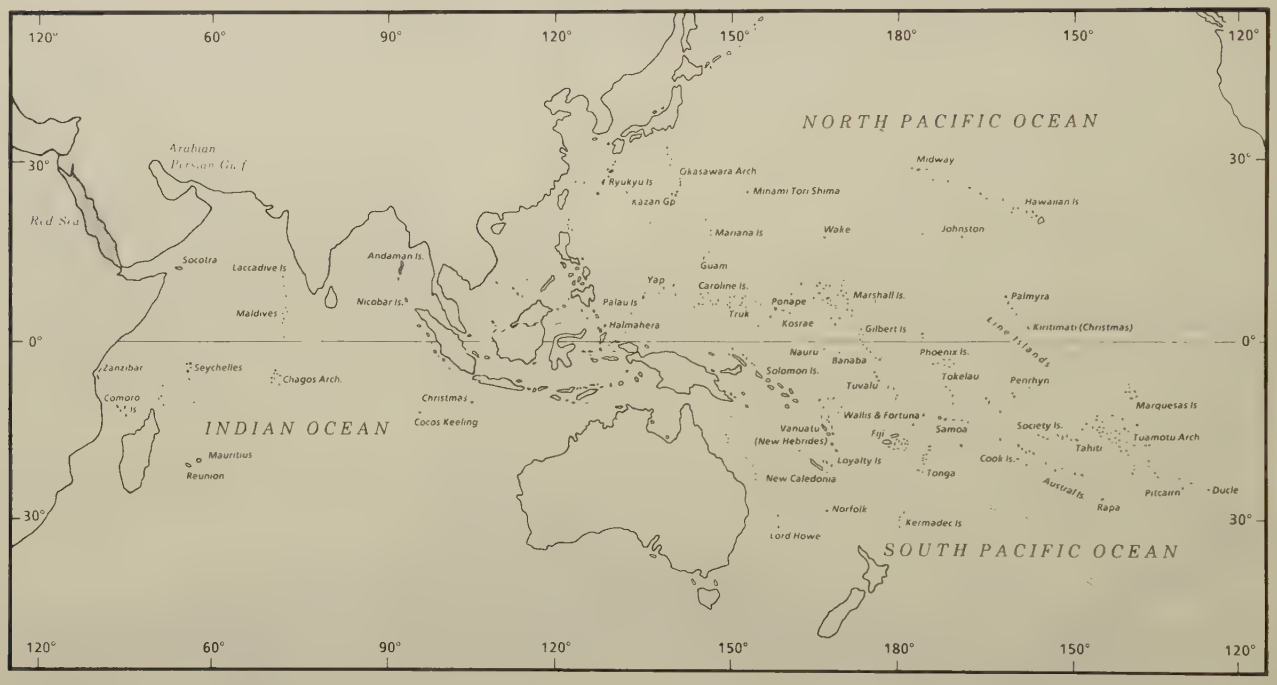
Synonyms: None.

FAO Names: **En** - Suez fusilier; **Fr** - Fusilier de Suez; **Sp** - Fusilero de Suez.

See also page 29, plate III, Figs 50a,b

Diagnostic Features: Body moderately slender, fusiform, and compressed. A single postmaxillary process; small conical teeth in jaws, vomer and palatines. Dorsal fin with 10 spines and 14 or 15 soft rays; anal fin with 3 spines and 12 soft rays; pectoral fin with 20 or 21 rays. Scales in lateral line 51 to 58 (most frequently 54); upper peduncular scale rows usually 11, lower peduncular scale rows usually 14 or 15; scale rows above lateral line to origin of dorsal fin 7 to 9; scale rows below lateral line to origin of anal fin 15 to 17; scale rows on cheek 4 or 5; predorsal scales usually 22 or 23; dorsal and anal fins scaled, the dorsal with about 3/5 of the greatest height of its spinous part covered with scales; supratemporal band of scales generally interrupted at dorsal midline by a narrow scaleless zone. **Colour:** most of body light to silvery blue, paler ventrally; a single, narrow, yellow stripe on side following the dorsal profile midway between dorsal profile and lateral line, extending from base of caudal fin anteriorly to a vertical at the first dorsal spine; a yellow streak within each lobe of caudal fin; tips of caudal fin lobes with a large black blotch which is bordered proximally by a white band; axil and upper base of pectoral fin black; pectoral, pelvic, and anal fins white to pale blue; dorsal fin bluish grey.

Geographical Distribution: Restricted to the Red Sea.



Habitat and Biology: Inhabits coastal areas, primarily on coral reefs. Feeds on zooplankton in large midwater aggregations. Often schools together with the other caesionids found in the Red Sea.

Size: Maximum size to about 35 cm.

Interest to Fisheries: Not commonly fished. It is occasionally caught by gill nets and handlines.

Local Names: Unavailable

Literature: Fischer & Bianchi (eds.) (1984); Randall (1983); Carpenter (1987)

Caesio teres Seale, 1906

CAES Caes 7

Caesio teres Seale, 1906, Occ.Pap.B.P.Bishop Mus., 4:44 (Shortland Island, Solomon Islands).

Synonyms: ***Caesio pulcherrimus*** Smith & Smith, 1963.

FAO Names: **En** - Yellow-and-blueback fusilier; **Fr** - Fusilier à dos jaune et bleu; **Sp** - Fusilero amarillo azulado.

See also page 25, plate I, Figs 45a,b

Diagnostic Features: Body moderately deep, fusiform and compressed. A single postmaxillary process; small teeth in jaws, vomer and palatines. Dorsal fin with 10 spines and 15 (rarely 14 or 16) soft rays; anal fin with 3 spines and 12 (rarely 13) soft rays; pectoral fin usually with 20 to 22 (most frequently 21) rays. Scales in lateral line 51 to 61 (most frequently 55); upper peduncular scale rows 11 to 13, lower peduncular scale rows usually 15 or 16; scale rows above lateral line to origin of dorsal fin usually 8 to 10 (most frequently 8); scale rows below lateral line to origin of anal fin usually 17 to 20; 4 or 5 scale rows on cheek; predorsal scales usually 21 to 25; dorsal and anal fins scaled, the dorsal with about 2/3 of the greatest height of its spinous part covered with scales; supratemporal band of scales interrupted at dorsal midline by a narrow scaleless zone. **Colour:** bright yellow on caudal fin, caudal peduncle, and body above a diagonal from just anterior to dorsal-fin origin to ventral origin of caudal peduncle, except in large individuals, particularly in the western Pacific, where the yellow does not extend as far anteriorly; remainder of upper two-thirds of body bright blue, the lower third silvery white; axil and upper base of pectoral fin black; pectoral, pelvic and anal fins white; dorsal fin bluish proximally and yellow distally.

Geographical Distribution: Widespread in the tropical Indo-West Pacific, from East Africa, not including the Red Sea or the Arabian (Persian) Gulf, to the Line Islands.

Habitat and Biology: Found primarily around coral reefs, with a preference for coralline lagoons. A rapidly moving schooling fish which ranges widely around reefs. Feeds on zooplankton in large midwater groups. Schools together with other caesionids, most often with *C. xanthonota*. It spawns in large aggregations around the full moon. Eggs pelagic, spherical, unpigmented, usually with a single transparent oil globule and a diametre of 0.77 to 0.78 mm.

Size: Maximum size to about 40 cm.

Interest to Fisheries: Of minor to moderate importance in coastal fisheries. Caught by drive-in nets, gill nets, handlines and traps. Marketed mostly fresh.

Local Names: INDONESIA: Ekor kuning pisang; PHILIPPINES: Bilason (Visayan), Dalagang bukid (Tagalog), Morong (Tagalog), Sulid (Visayan).

Literature: Amesbury & Myers (as *C. xanthonota*) (1982); Masuda et al. (as *C. xanthonota*) (1975); Carpenter (1987).

Remarks: This species has most often been erroneously referred to as *C. pulcherrimus* or confused with *C. xanthonota*.

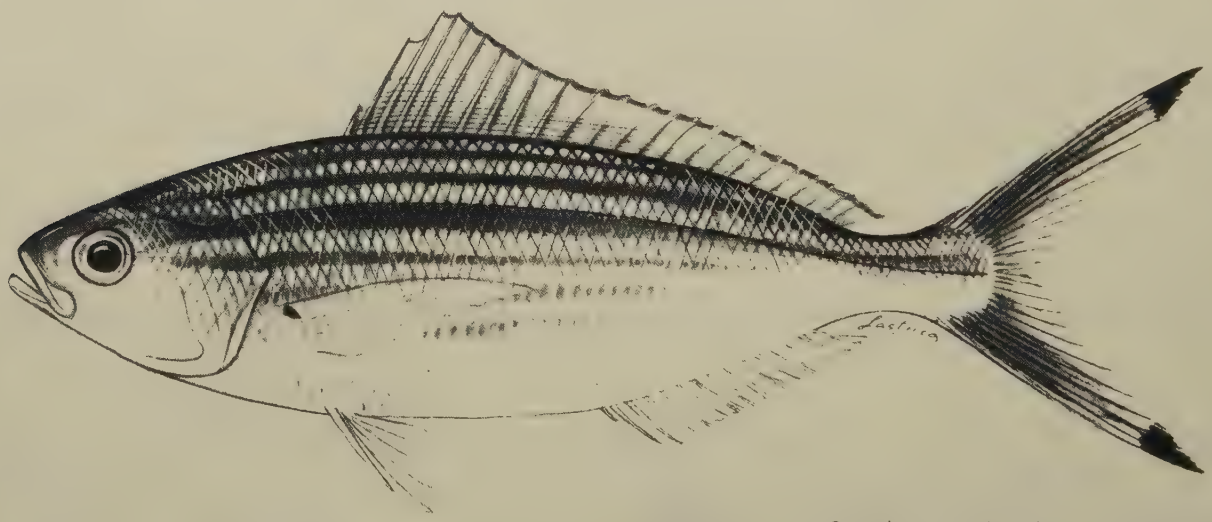
Caesio varilineata Carpenter, 1987

CAES Caes 8

Caesio varilineata Carpenter, 1987, Indo-Pac. Fish., 15:24, pl.2 fig.B, pl.6 fig.G [Arabian (Persian) Gulf].

Synonyms: None

FAO Names: En - Variable-lined fusilier; Fr - Fusilier à bandes variées; Sp - Fusilero listado.



See also page 27, plate II, Figs 49a,b

Diagnostic Features: Body moderately deep, fusiform and moderately compressed. Ratio of eye diameter to head length usually around 4.3 to 5.0; a single postmaxillary process. Dorsal fin with 10 spines and 15 (rarely 14 or 16) soft rays; anal fin with 3 spines and 12 (rarely 11 or 13) soft rays; pectoral fin with 20 to 23 (most frequently 21) rays. Scales in lateral line 57 to 67 (most frequently 62); upper peduncular scale rows usually 11, lower peduncular scale rows usually 15; scale rows above lateral line to origin of dorsal fin 8 to 10 (most frequently 9); scale rows below lateral line to origin of anal fin usually 15 to 17; usually 4 scale rows on cheek; predorsal scales 21 to 26; dorsal and anal fins scaled, the dorsal usually with about 4/5 of the greatest height of its spinous part covered with scales; supratemporal band of scales often interrupted at dorsal midline by a scaleless zone; always a 'v'-shaped scaleless zone anteriorly at midline intruding into the supratemporal band of scales. **Colour**: upper body blue, lower body white to pale bluish; 3 to 6 (usually 4) yellow longitudinal stripes on side, 2 or 3 of these stripes covering and/or above lateral line, and 2 or 3 below lateral line; width of stripes variable, usually narrow, about 1 scale wide; sometimes the stripe above the lateral line is about 2 scales wide; caudal fin with an indistinct bluish or dark streak within each lobe, the tips of caudal lobes with a large black blotch; pectoral, pelvic, and anal fins white; axil of pectoral fin black; a black triangular patch on upper base of pectoral fin; dorsal fin light blue to pale with a black distal border.

Geographical Distribution: Primarily Indian Ocean, from East Africa, including the Red Sea and the Arabian (Persian) Gulf, to western Indonesia.

Habitat and Biology: Primarily found around coral reefs. Feeds on zooplankton in midwater aggregations. A schooling fish, commonly in groups together with ***C. caerulaurea, C. striata***, and ***Pterocaesio tile***.

Size: Maximum size to about 40 cm.

Interest to Fisheries: Of minor to moderate importance to coastal fisheries. Fairly common in markets in tropical East Africa and Sri Lanka. Caught by gill nets, handlines and traps. Marketed fresh. Juveniles important as tuna baitfish in the Maldives and Laccadives.

Local Names: LACCADIVE ARCHIPELAGO: Churaichala, Furrua, Kekkurimugrhang.

Literature: Carpenter (1987).

Remarks: This species has previously been identified as ***Caesio caerulaurea.***

Caesio xanthonota Bleeker, 1853

CAES Caes 6

Caesio xanthonotus Bleeker, 1853, Nat.Tijdschr.Neder.-Indië, 4:466 (Indonesia).

Synonyms: None.

FAO Names: **En** - Yellowback fusilier; **Fr** - Fusilier à dos jaune; **Sp** - Fusilero de lomo amarillo.

See also page 25, plate I, Figs 43a,b

Diagnostic Features: Body moderately deep, fusiform and compressed. A single postmaxillary process; small conical teeth in jaws, vomer and palatines. Dorsal fin with 10 spines and 15 (rarely 14) soft rays; anal fin with 3 spines and 12 (rarely 11) soft rays; pectoral fin with 20 to 22 (most frequently 21) rays. Scales in lateral line 52 to 59 (most frequently 56); upper peduncular scale rows 11 or 12, lower peduncular scale rows usually 15; scale rows above lateral line to origin of dorsal fin usually 9 or 10; scale rows below lateral line to origin of anal fin usually 18 or 19; 4 or 5 scale rows on cheek; predorsal scales usually 21 to 23; dorsal and anal fins scaled, the dorsal with about 2/3 of the greatest height of its spinous part covered with scales; supratemporal band of scales interrupted at dorsal midline by a narrow scaleless zone. **Colour:** upper third of body and caudal fin bright yellow, middle third blue, lower third white; axil and upper base of pectoral fin black; pectoral, pelvic, and anal fins white; dorsal fin yellow.

Geographical Distribution: Primarily Indian Ocean, from East Africa, not including the Red Sea or the Arabian (Persian) Gulf, to Indonesia.

Habitat and Biology: Inhabits coastal areas, primarily around coral reefs. A schooling fish which feeds on zooplankton in large midwater aggregations. This species ranges widely among reefs during the day but shelters on the reef at night. It sometimes schools together with ***C. teres***, which has a similar colour pattern. ***C. xanthonota*** appears to prefer the coralline lagoon habitat more than most other species of caesionids.

Size: Maximum size to about 40 cm.

Interest to Fisheries: Of minor to moderate importance in coastal fisheries. Caught by gill nets, traps and handlines. Marketed mostly fresh.

Local Names: INDONESIA: Ekor kuning pisang; LACCADIVE ARCHIPELAGO: Donkevumas (Minicoy); MALDIVES: Donnomas.

Literature: Fischer & Bianchi (eds.) (1984); Gloerfelt-Tarp & Kailola (1984); Carpenter (1987).

Remarks: ***C. xanthonota*** and ***C. teres*** have often been confused with one another in the literature.

Dipterygonotus Bleeker, 1849

CAES Dipt

Genus: ***Dipterygonotus*** Bleeker, 1849, Jour.Indian Arch.East.Asia, 3:71. Type species, ***Dipterygonotus leucogrammicus***, Bleeker, 1849 (= ***Smaris balteatus*** Val. in C.&V., 1830), by original designation.

Synonyms: None.

Diagnostic Features: Body slender, fusiform, elongate and moderately compressed. Two postmaxillary processes; posterior end of maxilla tapered, its greatest depth anterior to hind end of premaxilla; small conical teeth on dentary and vomer; premaxilla and palatines without teeth; interorbital space convex; margin of opercle with a pronounced dorso-posterior flap. Dorsal fin deeply notched, the last few spines almost separate, usually with 14 spines and 8 to 11 soft rays; anal fin with 3 spines and usually 9 or 10 soft rays; pectoral fin with 16 to 19 rays; procurrent caudal rays typically 7or 8. Scales weakly ctenoid; dorsal and anal fins without scales; scales in lateral line 68 to 80; upper peduncular scale rows 11 to 14, lower peduncular scale rows 15 to 18; scale rows above lateral line to origin of dorsal fin 9 to 11; scale rows below lateral line to origin of anal fin 15 to 18; supratemporal band of scales indistinct, scales in interorbital region reaching near to ascending premaxillary process. Predorsal configuration /0 + 0/2/1 + 1/. Epipleural ribs 14, without flattened projections on the first 2. Markings: 3 stripes above lateral line, the 2 uppermost stripes irregular and usually interrupted; caudal lobes without distinctive markings.

Species: A single species recognized - see ***D. balteatus***.

Dipterygonotus balteatus (Valenciennes, 1830)

CAES Dipt 1

Smaris balteatus Valenciennes in C. & V. 1830, Hist.Nat.Poiss., 6:424 (Sri Lanka).

Synonyms: ***Dipterygonotus leucogrammicus*** Bleeker, 1849; ***Dipterygonotus gruveli*** Chabanaud, 1924a.

FAO Names: **En** - Mottled fusilier; **Fr** - Fusilier marbré; **Sp** - Fusilero jaspeado.

See also page 25, plate I, Fig. 42

Diagnostic Features: Body slender, fusiform, elongate and moderately compressed. Two postmaxillary processes; small conical teeth on dentary and vomer; premaxilla and palatines without teeth. Dorsal fin usually with 14 spines and 8 to 11 soft rays; anal fin with 3 spines and usually 9 or 10 soft rays; pectoral fin with 16 to 19 rays. Scales in lateral line 68 to 80; upper peduncular scale rows 11 to 14, lower peduncular scale rows 15 to 18; scale rows above lateral line to origin of dorsal fin 9 to 11; scale rows below lateral line to origin of anal fin 15 to 18; usually 6 to 9 scale rows on cheek; predorsal scales usually 29 to 34; dorsal and anal fins without scales, supratemporal band of scales indistinct, scales in interorbital region reaching near to ascending premaxillary process. **Colour:** upper body brownish bronze; a thin, straight, tan stripe about 1 scale wide from orbit to caudal fin, directly above lateral line for the anterior half of its length, about 2 scales above lateral line on caudal peduncle; above and parallel to this stripe 2 thin, irregular, and usually interrupted stripes of the same colour; lower body silvery white; dorsal, anal, pelvic, and pectoral fins clear to pinkish; axil of pectoral fin black; caudal fin tan to pinkish; when captured at night, the entire body and fins are often reddish.

Geographical Distribution: Widespread in the Indo-Pacific, from East Africa, not including the Red Sea or Arabian (Persian) Gulf, to the Solomon Islands.

Habitat and Biology: This is the only caesionid that, in the adult stage, is primarily a nearshore pelagic rather than a coral reef species. In the markets of the Philippines, ***D. balteatus*** is most frequently found mixed with sardines and anchovies. As juveniles, it schools together with juveniles of other caesionids on coral reefs. Feeds on zooplankton.

Size: Attains a total length of about 14 cm, which is the smallest maximum size of all fusiliers.

Interest to Fisheries: Important as a tuna baitfish in the Maldives and the Laccadive Archipelago. Occasionally marketed fresh along with sardines and anchovies in the Philippines. Caught at night using lights and dip nets.

Local Names: JAPAN: Tosoku chibiki; LACCADIVE ARCHIPELAGO: Dhandi muguram.

Literature: Gloerfelt-Tarp & Kailola (1984); Sainsbury et al. (1985); Carpenter (1987).

Remarks: This species is often mistaken as an emmelichthyid due to the similarity in body and dorsal fin shape.

Gymnocaesio Bleeker, 1876

CAES Gymn

Genus: ***Gymnocaesio*** Bleeker, 1876, Versl.Meded.Akad.Amsterdam, (Ser. 9), 2:152. Type species, ***Caesio gymnopterus*** Bleeker, 1856, by original designation.

Synonyms: None

Diagnostic Features: Body slender, fusiform, elongate and moderately compressed. Two postmaxillary processes; posterior end of maxilla tapered, its greatest depth anterior to hind end of premaxilla; small conical teeth on dentary and vomer; premaxilla and palatines without teeth; interorbital space flat; margin of opercle without a pronounced dorso-posterior flap. Dorsal fin continuous, all spines broadly connected by membranes, usually with 10 spines and 15 soft rays; anal fin with 3 spines and usually 12 rays; pectoral rays 20 to 22; procurrent caudal rays typically 7 or 8. Scales weakly ctenoid, median fins without scales; scales in lateral line 64 to 74; upper peduncular scale rows 11 or 12, lower peduncular scale rows 13 to 15; scale rows above lateral line to origin of dorsal fin 7 to 9; scale rows below lateral line to origin of dorsal fin 12 to 15; supratemporal band of scales distinct, confluent at dorsal midline. Predorsal configuration /0 + 0/0 + 2/1 + 1/. Epipleural ribs 14, without flattened projections on the first 2. Markings: a single thin stripe covering lateral line for most of its length; tips of caudal lobes with a blackish blotch (sometimes faint).

Species: A single species recognized - see ***G. gymnoptera.***

Gymnocaesio gymnoptera (Bleeker, 1856)

CAES Gymn 1

Caesio gymnopterus Bleeker, 1856, Nat.Tijdschr.Neder.-Indië, 10:372 (Ternate, Indonesia).

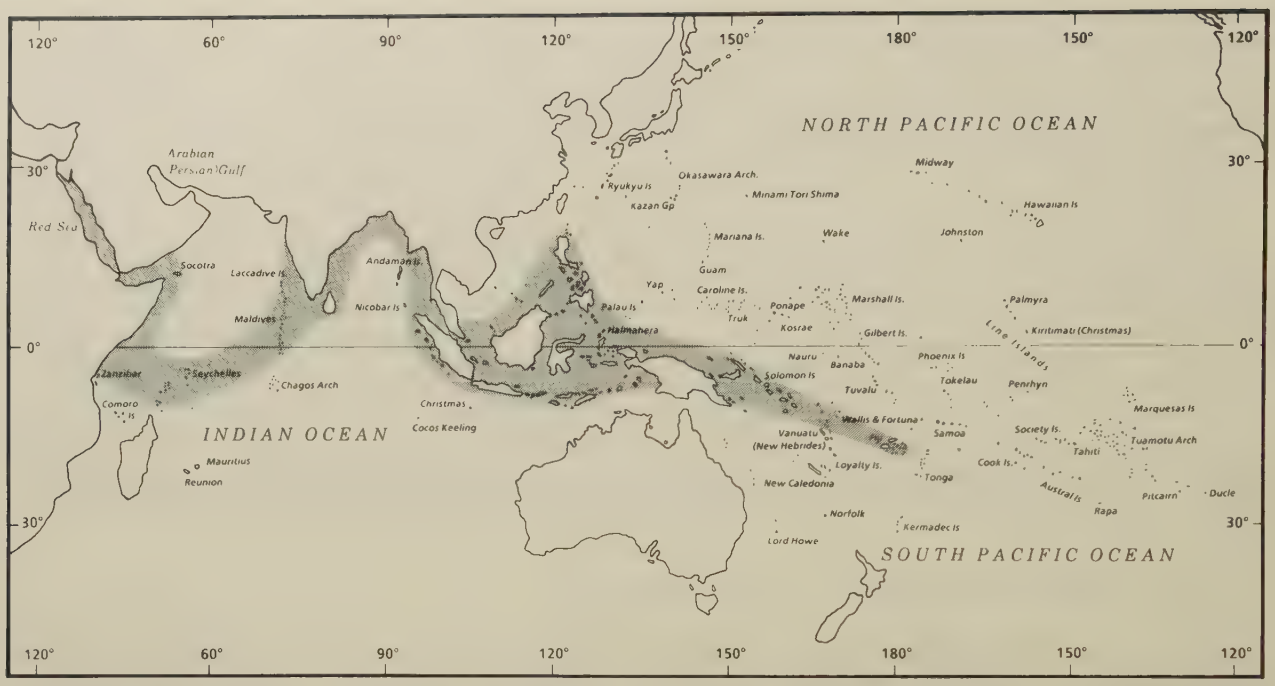
Synonyms: None.

FAO Names: **En** - Slender fusilier; **Fr** - Fusilier élégant; **Sp** - Fusilero elegante.

See also page 31, plate IV, Fig. 56

Diagnostic Features: Body slender, fusiform, elongate and moderately compressed. Two postmaxillary processes; posterior end of maxilla tapered, its greatest depth anterior to hind end of premaxilla; small conical teeth on dentary and vomer; premaxilla and palatines without teeth. Dorsal fin with 10 (rarely 11) spines and 15 (rarely 14 or 16) soft rays; anal fin with 3 spines and 12 (rarely 11 or 13) rays; pectoral fin with 20 to 22 rays. Scales in lateral line 64 to 74 (most frequently 70); upper peduncular scale rows usually 11, lower peduncular scale rows usually 14 or 15; scale rows above lateral line to origin of dorsal fin 7 to 9; scale rows below lateral line to origin of anal fin usually 13 or 14; usually 4 scale rows on cheek; predorsal scales usually 23 to 26; dorsal and anal fin without scales. **Colour:** upper body bluish green, the centres of scales lighter, giving a striped appearance; a single yellow or brown stripe about 1 scale wide covering the lateral line for most of its length, running dorsal to lateral line on caudal peduncle; often a bright blue longitudinal band directly below the lateral line stripe covering up to 1/3 of the side; body silvery white ventrally; axil of pectoral fin black; pectoral, pelvic, dorsal, and anal fins white; caudal fin dusky, the tips of the lobes black.

Geographical Distribution: Widespread in the Indo-West Pacific, from East Africa, including the Red Sea, to Fiji.



Habitat and Biology: Inhabits coastal areas ranging widely around coral reefs. Feeds on zooplankton in large midwater aggregations. A schooling fish, often in groups with members of the genus ***Pterocaesio***.

Size: Reaches a maximum size of about 18 cm.

Interest to Fisheries: Of minor importance to fisheries. Occasionally caught with traps and drive-in nets and marketed fresh in the Philippines. Used as a baitfish for tuna fisheries in the Maldives, the Laccadives, and the West Pacific.

Local Names: LACCADIVE ARCHIPELAGO: Dandi mugurang; PHILIPPINES: Dalagang bukid (Tagalog); Sulid (Visayan).

Literature: Randall (1983); Gloerfelt-Tarp & Kailola (1984); Carpenter (1987).

Pterocaesio Bleeker, 1876

CAES Pter

Genus: ***Pterocaesio*** Bleeker, 1876, Versl.Meded.Akad.Amsterdam, (Ser. 9), 2:153. Type species, ***Caesio multiradiatus*** Steindachner, 1861 (= ***Caesio tile*** Cuvier in C. & V., 1830), by original designation.

Synonyms: ***Liocaesio*** Bleeker, 1876; ***Clupeolabrus*** Nichols, 1923.

Diagnostic Features: Body fusiform, elongate, and moderately compressed. Two postmaxillary processes; posterior end of maxilla tapered, its greatest depth anterior to hind end of premaxilla; small conical teeth in jaws; vomer and palatines with or without small conical teeth; interorbital space convex; margin of opercle with a distinct dorso-posterior flap. Dorsal fin continuous, with 10 or 11 spines and 14 to 16 soft rays, or 10 to 12 spines and 19 to 22 soft rays; spines connected broadly by membranes, anal fin with 3 spines and 11 to 13 soft rays; pectoral fin with 17 to 24 rays; procurrent caudal rays typically 9 or 10. Scales weakly ctenoid; median fins with scales in oblique rows; scales in lateral line 62 to 88, circumpeduncular scales 10 to 14 + 13 to 18; scale rows above lateral line to origin of dorsal fin 7 to 11; scale rows below lateral line to origin of anal fin 13 to 20; supratemporal band of scales distinct, confluent at dorsal midline. Predorsal configuration 0/0/0 + 2/1 + 1/ or /0 + 0/0 + 2/1 + 1. Epipleural ribs 14 (rarely 13 or 15); flattened projections present on first and second epipleural ribs in some species. Anterior profile of first anal pterygiophore either strongly or weakly convex distally. Markings: side without markings, with longitudinal stripe(s), or with a large blotch above pectoral-fin base; caudal-fin lobes with black tips or with a longitudinal blackish streak in middle of each lobe.

Biology Habitat and Distribution : They inhabit coastal areas of the Indo-West Pacific, primarily around coral reefs. They are schooling fishes, often found in mixed aggregations with other species of ***Pterocaesio***. They feed on zooplankton in midwater. Reproduction appears to be characterized by early sexual maturity, high fecundity, prolonged spawning season and group spawning on a lunar cycle.

Interest to Fisheries: Of minor to moderate importance as food fish. Caught by drive-in nets, gill nets, traps, trawls and handlines. Marketed fresh and dried-salted. Juveniles and adults of some species are very important as baitfish for tuna fisheries.

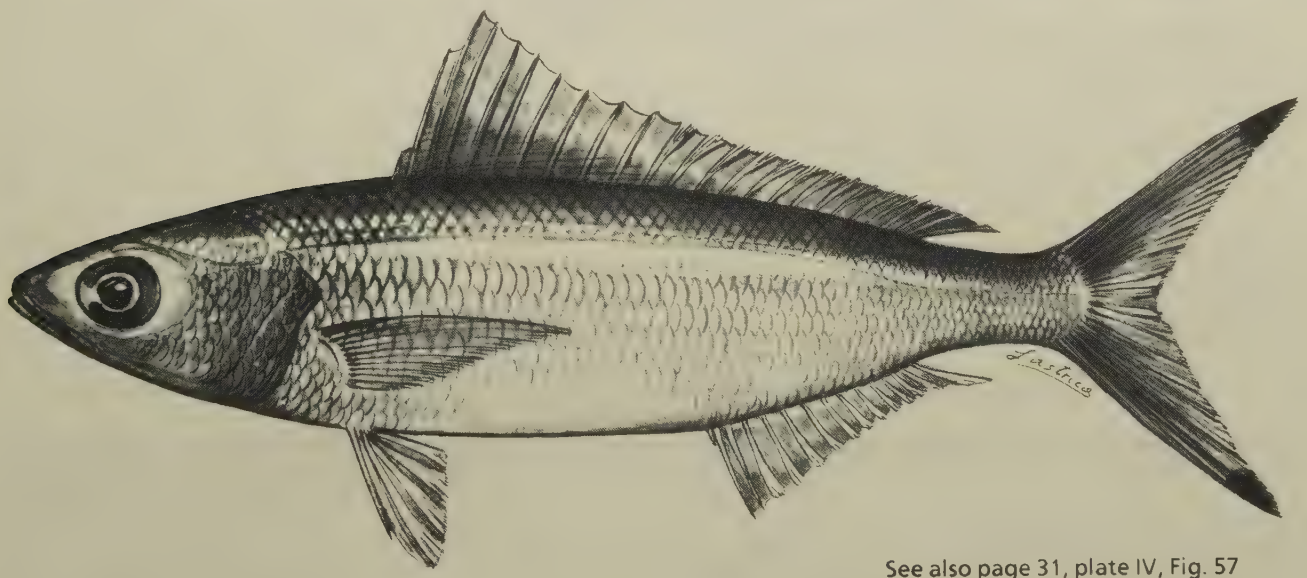
Species: Ten species and 3 subgenera are recognized: ***Pterocaesio (Pterocaesio) tile, P. (Pisinnicaesio) digramma, P. (Pi.) chrysozona, P. (Pi.) pisang, P. (Squamosicaesio) marri, P. (S.) randalli, P. (S.) lativittata, P. (S.) capricornis, P. (S.) trilineata*** and, ***P. (S.) tessellata***.

Pterocaesio capricornis Smith & Smith, 1963 — **CAES Pter 5**

Pterocaesio capricornis Smith & Smith, 1963, The Fishes of Seychelles, p. 29, pl.94, Fig. E (Pinda, Mozambique).

Synonyms: None.

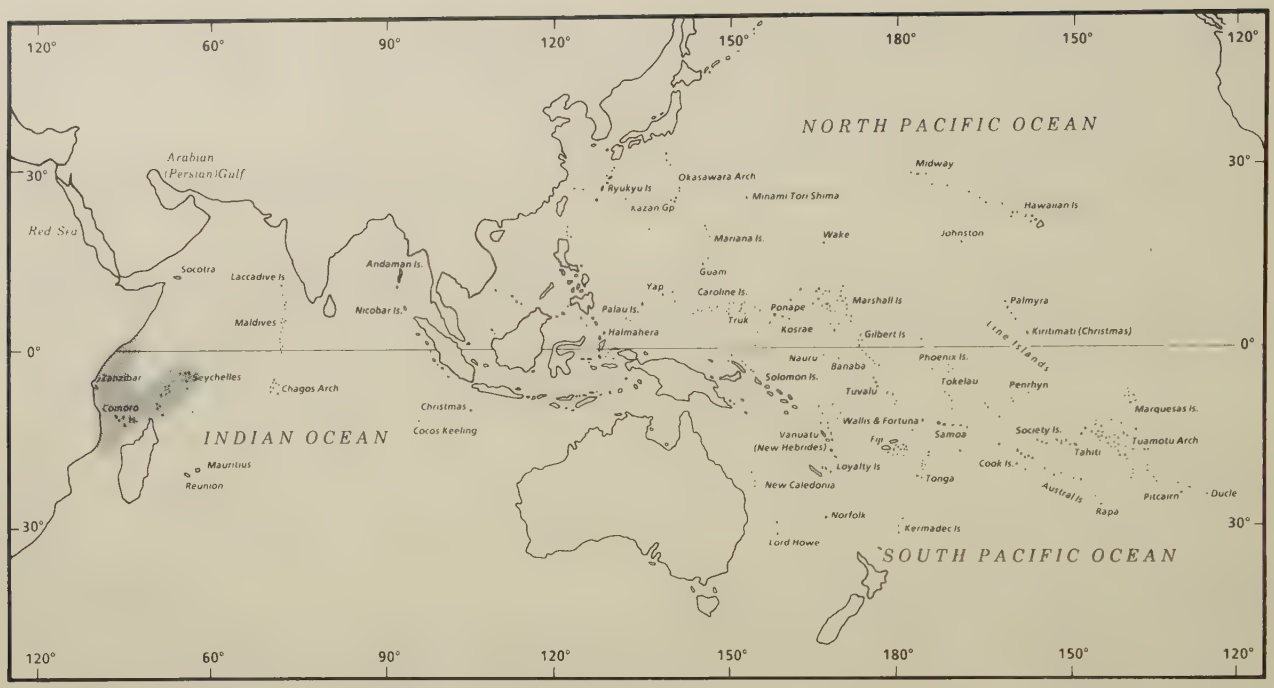
FAO Names: **En** - Capricorn fusilier; **Fr** - Fusilier capricorne; **Sp** - Fusilero capricornio.



See also page 31, plate IV, Fig. 57

Diagnostic Features: Body fusiform, elongate and moderately compressed. Two postmaxillary processes; small conical teeth in jaws; vomer and palatines without teeth. Dorsal fin with 10 spines and 15 soft rays; anal fin with 3 spines and 12 soft rays; pectoral fin with 19 rays. Scales in lateral line 65 to 68; upper peduncular scale rows 11, lower peduncular scale rows 15; scale rows above lateral line to origin of dorsal fin 8 or 9; scale rows below lateral line to origin of anal fin 15; 4 scale rows on cheek; predorsal scales 24; dorsal and anal fins scaled, the dorsal with about 1/3 of the greatest height of its spinous part covered with scales. **Colour**: (according to Smith & Smith, 1963) body chequered bronzy green yellow and blue above, belly pink; a narrow yellow stripe along the body from behind the eye covering the lateral line for most of its length, above the lateral line on caudal peduncle; dorsal fin blue and yellow in front, pink behind; pectoral, pelvic and caudal fins pink; tips of caudal lobes dark brown to black.

Geographical Distribution: Western Indian Ocean, restricted to East Africa.



Habitat and Biology: Inhabits coastal areas, primarily around coral reefs. Feeds on zooplankton in midwater aggregations.

Size: Maximum size probably around 21 cm.

Interest to Fisheries: Rare in markets.

Local Names: Unavailable

Literature: Carpenter (1987).

Pterocaesio chrysozona (Cuvier, 1830)

CAES Pter 1

Caesio chrysozona Cuvier [Kuhl & van Hasselt, ms] in C. & V., 1830, Hist.Nat.Poiss., 6:440 (Indonesia)

Synonyms: ***Pristipomoides aurolineatus*** Day, 1867.

FAO Names: **En** - Goldband fusilier; **Fr** - Caesio à ceinture d'or; **Sp** - Fusilero cinta dorada.

See also page 31, plate IV, Figs 54a,b

Diagnostic Features: Body fusiform, elongate and moderately compressed. Two postmaxillary processes; small conical teeth in jaws, vomer and palatines. Dorsal fin with 10 (rarely 11) spines and 15 (rarely 14 or 16) soft rays; anal fin with 3 spines and 12 (rarely 11 or 13) soft rays; pectoral fin with 17 to 20 (most frequently 19) rays. Scales in lateral line usually 64 to 69; upper peduncular scale rows usually 11, lower peduncular scale rows usually 15; scale rows above lateral line to origin of dorsal fin 7 to 9; scale rows below lateral line to origin of anal fin usually 14 to 16; usually 4 scale rows on cheek; predorsal scales usually 23 to 26; dorsal and anal fins scaled, the dorsal with about 1/2 of the greatest height of its spinous part covered with scales. **Colour**: upper body light blue to brownish, lower body white to pinkish; a bright yellow band directly below lateral line for most of its length, from behind eye to base of caudal fin, 2 or 3 scales wide anteriorly, tapering to 1 scale in width on caudal peduncle where it is above lateral line; a less conspicuous yellow stripe along dorsal midline; fins white to pinkish; axil of pectoral fin black; dorsal fin slightly dusky distally; tips of caudal lobes black.

Geographical Distribution: Widespread in the Indo-West Pacific, from East Africa, including the Red Sea, to eastern Australia.

Habitat and Biology: Ranges widely around coral reefs in schools. Often found in groups with other caesionids. Feeds on zooplankton in large midwater aggregations.

Size: Reaches a maximum size of about 21 cm.

Interest to Fisheries: Moderately important as a food fish in some areas. Common in the markets of Sri Lanka and the Philippines. Caught by drive-in nets, gill nets, traps, handlines and, occasionally by trawls. A valuable tuna baitfish in the Laccadives and Maldives.

Local Names: INDONESIA: Pisang-pisang; JAPAN: Takasago; LACCADIVE ARCHIPELAGO: Churaichala, Furrua, Huden mugurang; MALAYSIA: Delah karang; PAPUA NEW GUINEA: Gawani; PHILIPPINES: Bidlawan (Visayan), Dalagang bukid (Tagalog); SRI LANKA: Hemala, Ilitta.

Literature: Schroeder (as ***P. pisang*** 225-A) (1980); Randall (1983); Fischer & Bianchi, eds. (1984); Gloerfelt-Tarp & Kailola (1984); Sainsbury et al. (as ***P. digramma***); Carpenter (1987).

Pterocaesio digramma (Bleeker, 1865)

CAES Pter 2

Caesio digramma Bleeker, 1865, Nat.Tijdschr.Dierk., 2:180 (Ambon, Indonesia).

Synonyms: None.

FAO Names: **En** - Double-lined fusilier; **Fr** - Fusilier à deux bandes jaunes; **Sp** - Fusilero de dos bandas.

See also page 33, plate V, Fig. 61

Diagnostic Features: Body fusiform, elongate and moderately compressed. Two postmaxillary processes; small conical teeth in jaws, vomer and palatines. Dorsal fin with 10 spines and 15 (rarely 14 or 16) soft rays; anal fin with 3 spines and 12 (rarely 11) soft rays; pectoral fin usually with 20 to 22 (most frequently 21) rays. Scales in lateral line 66 to 76 (most frequently 72); upper peduncular scale rows usually 12 or 13, lower peduncular scale rows usually 16 or 17; scale rows above lateral line to origin of dorsal fin 9 to 11; scale rows below lateral line to origin of anal fin usually 17 or 18; 4 or 5 scale rows on cheek; predorsal scales usually 26 to 28; dorsal and anal fins scaled, the dorsal with about 1/2 of the greatest height of its spinous part covered with scales. **Colour**: body blue to greenish dorsally, white ventrally; 2 longitudinal yellow stripes laterally, the lower running from behind upper orbit about 1 scale below the lateral line to a vertical at about middle of soft portion of dorsal fin where it crosses and usually passes above lateral line for the length of the caudal peduncle; upper stripe 1 to 2 scales below dorsal profile for most of length of body, ending dorsally on caudal peduncle; fins white to pinkish; axil of pectoral fin black; dorsal fin slightly dusky distally; tips of caudal lobes black.

Geographical Distribution: Primarily in the western Pacific, from Indonesia and western Australia to New Caledonia, north to southern Japan.

Habitat and Biology: Found in coastal areas, primarily around coral reefs. A schooling fish, often in mixed-species groups containing other pterocaesionids. Feeds on zooplankton in midwater aggregations.

Size: Reaches a maximum size of about 30 cm.

Interest to Fisheries: Moderately important as a food fish. This species is one of the most common caesionids in Philippine markets. Caught mostly by drive-in nets, gill nets, and traps. Marketed mostly fresh; sometimes dried-salted.

Local Names: JAPAN: Nisen-takasago; PHILIPPINES: Dalagang bukid (Tagalog), Utdan (Visayan).

Literature: Schroeder (as ***P. chrysozonus***) (1980); Fischer & Bianchi (eds) (1984); Gloerfelt-Tarp & Kailola (1984); Gloerfelt-Tarp & Kailola (1984); Shen (as ***Caesio chrysozona***) (1984); Carpenter (1987).

Remarks: ***Pterocaesio digramma*** has frequently been misspelled in the literature as '***diagramma***'.

Pterocaesio lativittata Carpenter, 1987

CAES Pter 6

Pterocaesio lativittata Carpenter, 1987, Indo-Pac. Fish., 15:40, pl.4 fig.B (Cocos-Keeling Islands).

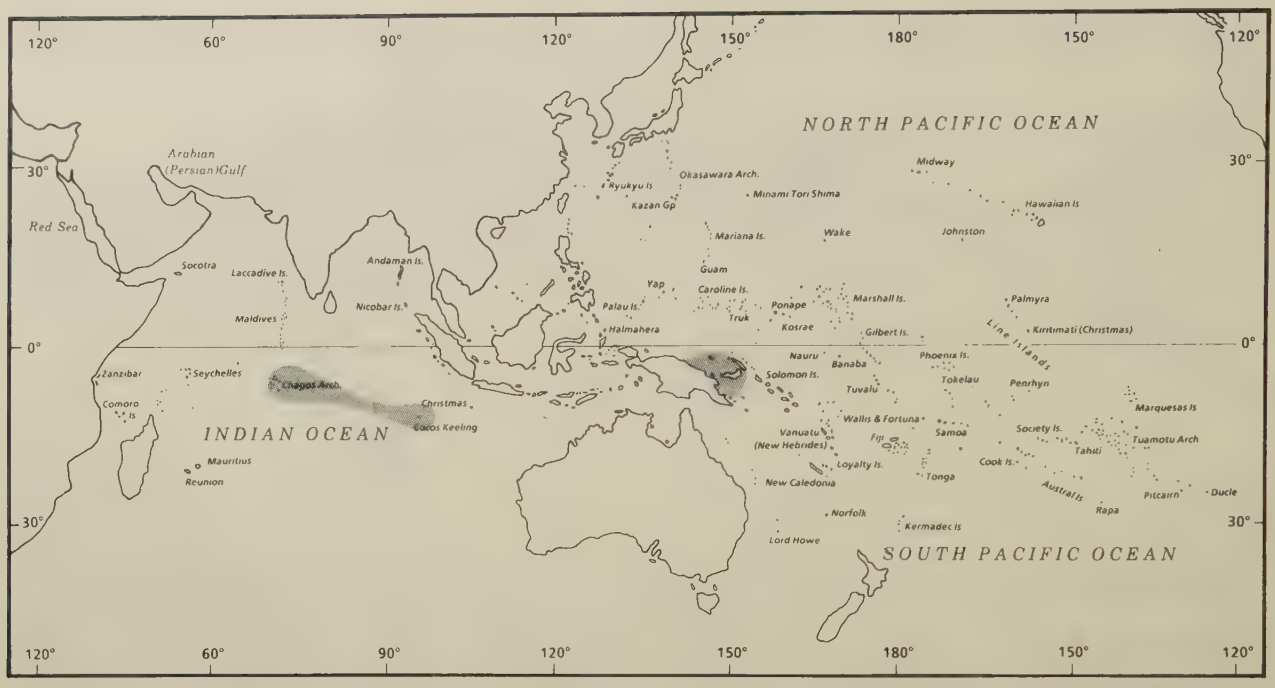
Synonyms: None.

FAO Names: **En** - Wide-band fusilier; **Fr** - Fusilier à bande large; **Sp** - Fusilero de banda ancha.

See also page 31, plate IV, Fig. 55

Diagnostic Features: Body fusiform, elongate and moderately compressed. Two postmaxillary processes; small conical teeth in jaws and vomer; palatines without teeth. Dorsal fin with 10 spines and 15 (rarely 14 or 16) soft rays; anal fin with 3 spines and 12 (rarely 13) soft rays; pectoral fin with 21 to 23 (most frequently 22) rays. Scales in lateral line 74 to 88; upper peduncular scale rows 12 to 14, lower peduncular scale rows usually 16 or 17; scale rows above lateral line to origin of dorsal fin usually 9 or 10; scale rows below lateral line to origin of anal fin usually 16 to 18; usually 4 scale rows on cheek; predorsal scales 23 to 30; dorsal and anal fin scaled, the dorsal with about 1/2 of the height of its spinous part covered with scales; supratemporal band of scales confluent at dorsal midline. **Colour:** upper body bluish or reddish, lighter ventrally; a bright yellow band straddling the lateral line for most of its length, from tip of snout to base of caudal fin, 3 to 5 scales wide anteriorly, tapering to 1 scale in width on caudal peduncle where it is above the lateral line; fins white to pinkish; dorsal fin slightly dusky distally and yellowish near base; axil of pectoral fin with a black blotch; tips of caudal lobes black.

Geographical Distribution: Eastern Indian Ocean and western Pacific, from the Chagos Archipelago to Papua New Guinea.



Habitat and Biology: Inhabits coastal areas around coral reefs. A schooling fish, sometimes in groups with other species of ***Pterocaesio***. Feeds on zooplankton in midwater aggregations.

Size: Maximum size estimated to be about 20 cm.

Interest to Fisheries: Of minor importance in fisheries; rarely seen in markets.

Local Names: Unavailable

Literature: Carpenter (1987).

Remarks: This species has been mistaken for ***P. chrysozona*** due to the close resemblance in colour pattern, although the two species are easily separated by meristic and osteological characters.

Pterocaesio marri Schultz, 1953

CAES Pter 7

Pterocaesio marri Schultz, 1953, U.S.Natl.Mus.Bull., 202:545 (Bikini Atoll, Marshall Islands).

Synonyms: ***Pterocaesio kohleri*** Schultz, 1953.

FAO Names: **En** - Marr's fusilier; **Fr** - Fusilier de Marr; **Sp** - Fusilero de Marr.

See also page 33, plate V, Figs 60a,b

Diagnostic Features: Body fusiform, elongate and moderately compressed. Two postmaxillary processes; small conical teeth in jaws; vomer and palatines without teeth. Dorsal fin with 10 (rarely 11) spines and 15 (rarely 14 or 16) soft rays; anal fin with 3 spines and 12 (rarely 11 or 13) soft rays; pectoral fin with 22 to 24 (most frequently 23) rays. Scales in lateral line usually 70 to 75; upper peduncular scale rows usually 12 or 13, lower peduncular scale rows usually 16 or 17; scale rows above lateral line to origin of dorsal fin 9 to 11; scale rows below lateral line to origin of anal fin usually 16 to 18; usually 5 scale rows on cheek; predorsal scales usually 26 to 30; dorsal and anal fins scaled, the dorsal with about 1/2 of the greatest height of its spinous part covered with scales; supratemporal band of scales confluent at dorsal midline. **Colour**: body blue to greenish dorsally, white ventrally; 2 longitudinal stripes laterally, about 1 scale wide each, the lower running from behind the supratemporal membrane, covering the lateral line to a vertical at about middle of soft portion of dorsal fin where it passes above lateral line for the length of caudal peduncle; upper stripe 1 to 2 scales below dorsal profile for most of length of body, ending dorsally on caudal peduncle; fins white to pinkish, dorsal fin slightly dusky distally; axil of pectoral fin and tips of caudal lobes black.

Geographical Distribution: Widespread in the Indo-West Pacific, from East Africa, not including the Red Sea or the Arabian (Persian) Gulf, to the Marquesas Islands.

Habitat and Biology: Ranges widely around coral reefs in schools. This species appears to prefer clear waters of oceanic islands or reefs far from large land masses. Feeds on zooplankton in midwater aggregations.

Size: Reaches a maximum size of about 35 cm.

Interest to Fisheries: Of minor importance to fisheries. Caught fairly often by drive-in nets in western Palawan, Philippines, and in other areas occasionally by gill nets and traps. Sometimes used as baitfish in the Indian Ocean and West Pacific tuna fisheries.

Local Names: PHILIPPINES: Dalagang bukid.

Literature: Amesbury & Myers (as ***P. chrysozona***) (1982); Carpenter (1987).

Remarks: This species has often been misidentified as ***P. digramma***.

Pterocaesio pisang (Bleeker, 1853)

CAES Pter 3

Caesio pisang Bleeker, 1853, Nat.Tijdschr.Neder.-Indië, 4:113 (Ambon, Molucca Islands).

Synonyms: None

FAO Names: **En** - Banana fusilier; **Fr** - Fusilier banane; **Sp** - Fusilero banana.

See also page 29, plate III, Figs 52a,b

Diagnostic Features: Body fusiform, elongate and moderately compressed. Two postmaxillary processes; small conical teeth in jaws, vomer and palatines. Dorsal fin with 10 (rarely 11) spines and 15 (rarely 14 or 16) soft rays; anal fin with 3 spines and 12 (rarely 11 or 13) soft rays; pectoral fin with 18 to 20 (most frequently 19) rays. Scales in lateral line 63 to 71; upper peduncular scale rows usually 11, lower peduncular scale rows usually 15; scale rows above lateral line to origin of dorsal fin 8 to 10; scale rows below lateral line to origin of anal fin usually 14 or 15; usually 4 scale rows on cheek; predorsal scales usually 23 to 26; dorsal and anal fins scaled, the dorsal with about 1/2 of the greatest height of its spinous part covered with scales. **Colour:** body colouration variable, dark red to silvery, paler ventrally; lateral line darker than background colouration; no stripes or bands on side; snout often yellowish; axil of pectoral fin black; tips of caudal lobes dark red to black.

Geographical Distribution: Widespread in the Indo-West Pacific, from East Africa, not including the Red Sea or the Arabian (Persian) Gulf, eastward to Fiji.

Habitat and Biology: Ranges widely around coral reefs. A schooling fish, sometimes in groups with other species of ***Pterocaesio***. Feeds on zooplankton in midwater aggregations.

Size: Reaches a maximum size of about 21 cm.

Interest to Fisheries: A common food fish in the Philippines; of minor importance in other areas. Caught mostly by drive-in nets, gill nets, and traps. Marketed fresh and sometimes as dried-salted. An important tuna baitfish in the Indian Ocean and in the West Pacific.

Local Names: INDONESIA: Pisang-pisang; JAPAN: Takasago; LACCADIVE ARCHIPELAGO: Churaichala, Huden mugurang; PHILIPPINES: Bidlawan (Visayan); Dalagang bukid (Tagalog).

Literature: Fischer & Bianchi (eds.) (1984); Gloerfelt-Tarp & Kailola (1984); Carpenter (1987).

Pterocaesio randalli Carpenter, 1987

CAES Pter 8

Pterocaesio randalli Carpenter, 1987, Indo-Pac.Fish., 15:35, pl.3 fig.D, pl.7 fig.F (Philippines).

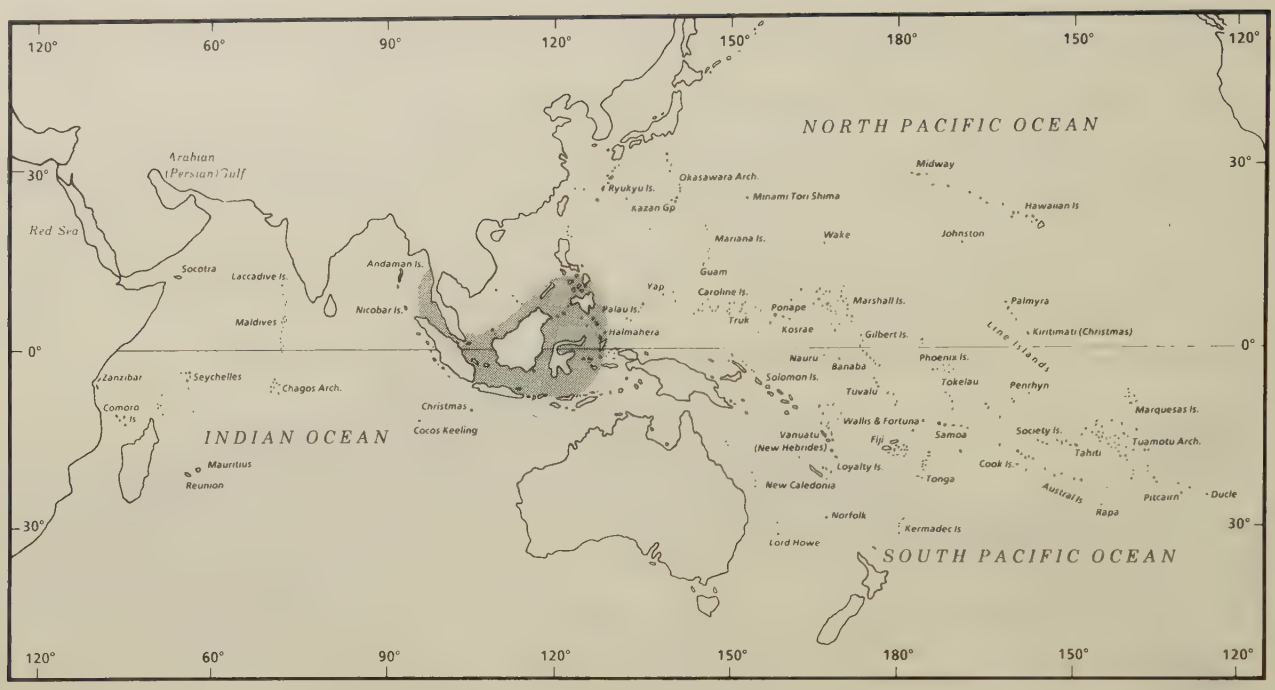
Synonyms: None.

FAO Names: **En** - Randall's fusilier; **Fr** - Fusilier de Randall; **Sp** - Fusilero de Randall.

See also page 29, plate III, Figs 53a,b

Diagnostic Features: Body fusiform, elongate and moderately compressed. Two postmaxillary processes; small conical teeth in jaws; vomer and palatines without teeth. Dorsal fin with 10 spines and 15 (rarely 14 or 16) soft rays; anal fin with 3 spines and 12 soft rays; pectoral fin with 20 to 22(most frequently 21) rays. Scales in lateral line 69 to 80; upper peduncular scale rows usually 11 to 13, lower peduncular scale rows usually 15 or 16; scale rows above lateral line to origin of dorsal fin usually 9 or 10; scale rows below lateral line to origin of anal fin usually 16 or 17; 4 scale rows on cheek; predorsal scales 22 to 27; dorsal and anal fin scaled, the dorsal with about 1/2 of the height of its spinous part covered with scales; supratemporal band of scales confluent at dorsal midline. **Colour:** body blue-green to reddish dorsally, lighter ventrally; a large yellow blotch of variable size above pectoral fin, roughly rhomboid in shape, with the oblique side slanting anteriorly, typically starting posterior to upper rim of orbit, covering the opercle above pectoral base and 2 or 3 scales above lateral line, stretching posteriorly to about a vertical at anal-fin origin, 6 or 7 scales in height and about 14 scales in width; pectoral, pelvic and anal fins white to pinkish; dorsal fin blue-green to pinkish; axil of pectoral fin and tips of caudal lobes black.

Geographical Distribution: Eastern Indian Ocean and western Central Pacific, from the Andaman Sea to the Philippines.



Habitat and Biology: Ranges widely around coral reefs in schools. Often occurs in groups with other species of *Pterocaesio*. Feeds on zooplankton in midwater aggregations.

Size: Reaches a maximum size of about 25 cm.

Interest to Fisheries: Of minor importance to fisheries. Occasionally caught by drive-in nets, gill nets, traps and handlines.

Local Names: PHILIPPINES: Dalagang bukid.

Literature: Carpenter (1987)

Pterocaesio tessellata Carpenter, 1987

CAES Pter 9

Pterocaesio tessellata Carpenter, 1987, Indo-Pac.Fish., 15:47, pl.5 fig.D, pl.7 fig.J (Philippines).

Synonyms: None.

FAO Names: **En** - One-stripe fusilier; **Fr** - Fusilier à une bande; **Sp** - Fusilero de una banda.

See also page 33, plate V, Figs 58a,b

Diagnostic Features: Body fusiform, elongate and moderately compressed. Two postmaxillary processes; small conical teeth in jaws and vomer; palatines without teeth. Dorsal fin with 10 (rarely 11) spines and 15 (rarely 14 or 16) soft rays; anal fin with 3 spines and 12 (rarely 11 or 13) soft rays; pectoral fin with 20 to 22 (most frequently 21) rays. Scales in lateral line usually 69 to 74; upper peduncular scale rows usually 11 to 13, lower peduncular scale rows 15 to 17; scale rows above lateral line to origin of dorsal fin usually 9 or 10; scale rows below lateral line to origin of anal fin usually 16 to 18; usually 5 scale rows on cheek; predorsal scales 22 to 29; dorsal and anal fins scaled, the dorsal with about 1/2 of the greatest height of its spinous part covered with scales; supratemporal band of scales confluent at dorsal midline. **Colour** : upper body light bluish green; lower part whitish to pink; centres of scales lighter than distal portion on upper two-thirds of body, giving a checkered appearance (in many individuals the scale rows are uneven, giving a mosaic appearance); a single yellow longitudinal stripe laterally, about 1 scale wide, covering the lateral line for most of its length, usually running dorsal to lateral line on caudal peduncle; pectoral, pelvic, and anal fins white to pinkish; axil of pectoral fin black; dorsal fin light bluish green; caudal fin dusky, the tips of lobes black.

Geographical Distribution: Eastern Indian Ocean and western Central Pacific, from Sri Lanka to Vanuatu (New Hebrides).

Habitat and Biology: Inhabits coastal areas around coral reefs. A schooling fish, often found in groups with other species of ***Pterocaesio***. Feeds on zooplankton in midwater aggregations.

Size: Maximum size to about 25 cm.

Interest to Fisheries: Moderately important as a food fish. Common in markets in the Philippines. Caught primarily by drive-in nets, gill nets, and traps. Marketed mostly fresh.

Local Names: PHILIPPINES: Dalagang bukid.

Literature: Schroeder (as ***P. pisang*** 225-B) (1980); Gloerfelt-Tarp & Kailola (as ***P.*** sp.) (1984); Carpenter (1987).

Pterocaesio tile (Cuvier, 1830)

CAES Pter 4

Caesio tile Cuvier in C. & V., 1830, Hist.Nat.Poiss., 6:428. Type locality, Caroline Islands.

Synonyms: ***Caesio tricolor*** Cuvier [Parkinson, pl.] in C. & V., 1830; ***Caesio cylindricus*** Günther, 1859; ***Caesio multiradiatus*** Steindachner, 1861; ***Clupeolabrus dubius*** Nichols, 1923.

FAO Names: **En** - Dark-banded fusilier; **Fr** - Fusilier à ligne olive; **Sp** - Fusilero aceitunero.

See also page 27, plate II, Figs 48a,b

Diagnostic Features: Body fusiform, elongate and compressed. Two postmaxillary processes; small conical teeth in jaws, vomer and palatines. Dorsal fin with 11 or 12 (rarely 10) spines and 19 to 22 soft rays; anal fin with 3 spines and 13 soft rays; pectoral fin with 22 to 24 (most frequently 23) rays. Scales in lateral line 69 to 76 (most frequently 71); upper peduncular scale rows usually 11 or 12, lower peduncular scale rows usually 15 or 16; scale rows above lateral line to origin of dorsal fin 7 or 8; scale rows below lateral line to origin of anal fin usually 16 or 17; usually 4 scale rows on cheek; predorsal scales usually 27 to 30; dorsal and anal fins scaled, the dorsal with about 1/2 of the greatest height of its spinous part covered with scales. **Colour**: scales above lateral line bluish green in their centres and black on their margins, giving the appearance of a checkered pattern; lateral line covered for most of its length by a black stripe about one scale wide (on caudal peduncle this stripe is above the lateral line); a brilliant light blue zone below the black stripe, usually covering the middle third of body, but sometimes restricted to anterior part of body, or absent; lower third of body white to pinkish; pectoral, pelvic and anal fins white to pinkish; axil and upper base of pectoral fin black; dorsal fin light bluish green to pinkish; caudal fin with a black streak within each lobe, the upper streak continuous with the lateral stripe.

Geographical Distribution: Widespread in the Indo-West Pacific, from East Africa, not including the Red Sea or the Arabian (Persian) Gulf, to the Tuamotu Archipelago, as far north as southern Japan and south to Mauritius and the Austral Islands.

Habitat and Biology: Ranges widely around coral reefs. A schooling fish, found sometimes in groups with other caesionids. Feeds on zooplankton in midwater aggregations.

Size: Reaches a maximum size of about 30 cm.

Interest to Fisheries: Moderately important in small-scale fisheries. Caught by drive-in nets, gill nets, traps and handlines. Marketed fresh and dried-salted. Important as tuna baitfish in the Laccadive Archipelago and in the western Pacific.

Local Names: CAROLINE ISLANDS: Duri, Ikonid, Tinika, Tinipu; JAPAN: Kumasasa-hanamuro; LACCADIVE ARCHIPELAGO: Ry mugurang; PHILIPPINES: Dalagang bukid (Tagalog), Sulid (Visayan).

Literature: Masuda et al. (1975); Amesbury & Myers (1982); Fischer & Bianchi (eds.) (1984); Shen (1984); Carpenter (1987).

Pterocaesio trilineata Carpenter, 1987

CAES Pter 10

Pterocaesio trilineata Carpenter, 1987, Indo-Pac.Fish., 15:43, pl.4 fig.D, pl.7 fig.I (Fiji).

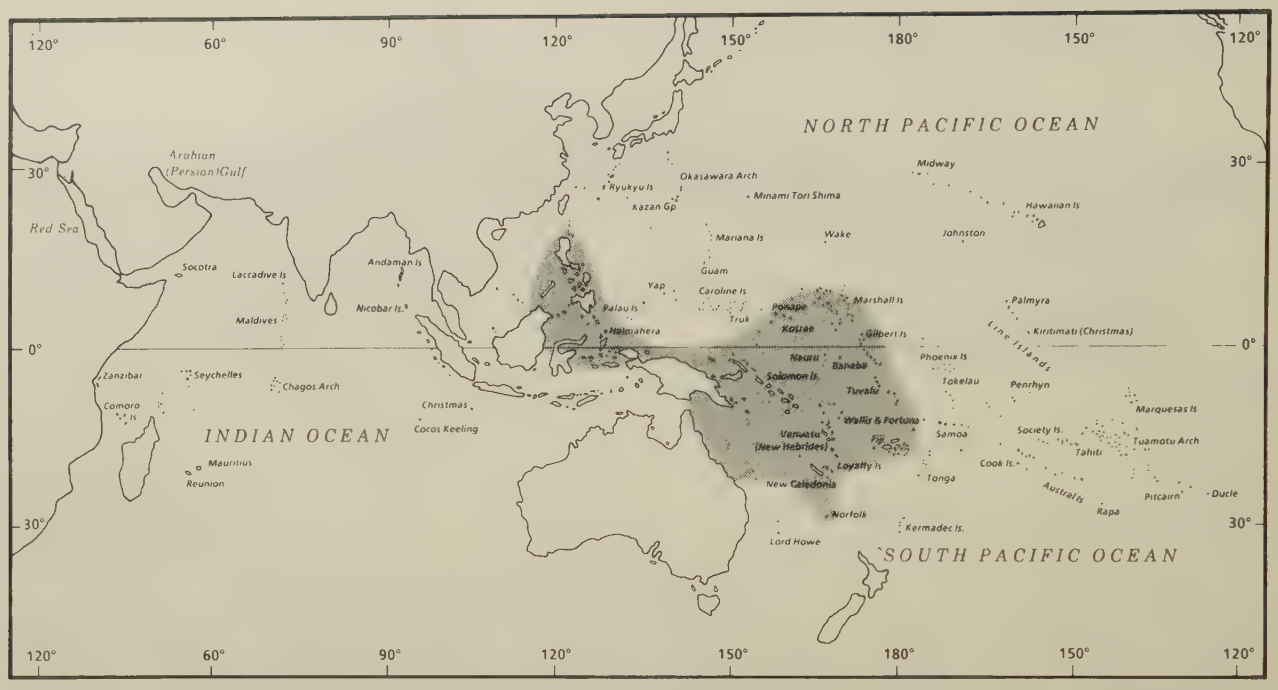
Synonyms: None.

FAO Names: **En** - Three-stripe fusilier; **Fr** - Fusilier à trois bandes; **Sp** - Fusilero de tres bandas.

See also page 33, plate V, Figs 59a,b

Diagnostic Features: Body fusiform, elongate and moderately compressed. Two postmaxillary processes; small conical teeth in jaws; vomer and palatines without teeth. Dorsal fin with 10 (rarely 11) spines and 15 (rarely 14 or 16) soft rays; anal fin with 3 spines and 12 (rarely 11) soft rays; pectoral fin usually with 19 to 21 (most frequently 20) rays. Scales in lateral line usually 63 to 69; upper peduncular scale rows usually 11, lower peduncular scale rows usually 15; scale rows above lateral line to origin of dorsal fin usually 8 or 9; scale rows below lateral line to origin of anal fin 14 to 17 (most frequently 15); usually 4 scale rows on cheek; predorsal scales 20 to 30; dorsal and anal fin scaled, the dorsal with about 1/3 of the height of its spinous part covered with scales; supratemporal band of scales confluent at dorsal midline. **Colour:** 3 dark brown to yellow and 3 light bluish white longitudinal stripes on upper side; lowest dark stripe about 2 scales wide, originating on snout and upper orbit, and covering the lateral line for most of its length, running dorsal to lateral line on caudal peduncle; middle dark stripe about 2 scales wide, originating on snout, running about midway between dorsal profile and lower dark stripe; uppermost stripe originating on snout and straddling the dorsal profile for about 1 scale to either side; bluish white stripes, about 1 to 1.5 scales wide, covering the spaces between the dark stripes and just below the lowest dark stripe; body whitish ventrally; pectoral, pelvic, and anal fins white; axil of pectoral fin black; dorsal fin light bluish; caudal fin dusky with lobe tips black.

Geographical Distribution: Western Pacific, from the Philippines to Fiji.



Habitat and Biology: Ranges widely around coral reefs in schools. Feeds on zooplankton in midwater aggregations.

Size: Maximum size about 20 cm.

Interest to Fisheries: Not common as a food fish. A fairly important tuna baitfish in the western Pacific.

Local Names: Unavailable.

Literature: Carpenter (1987).

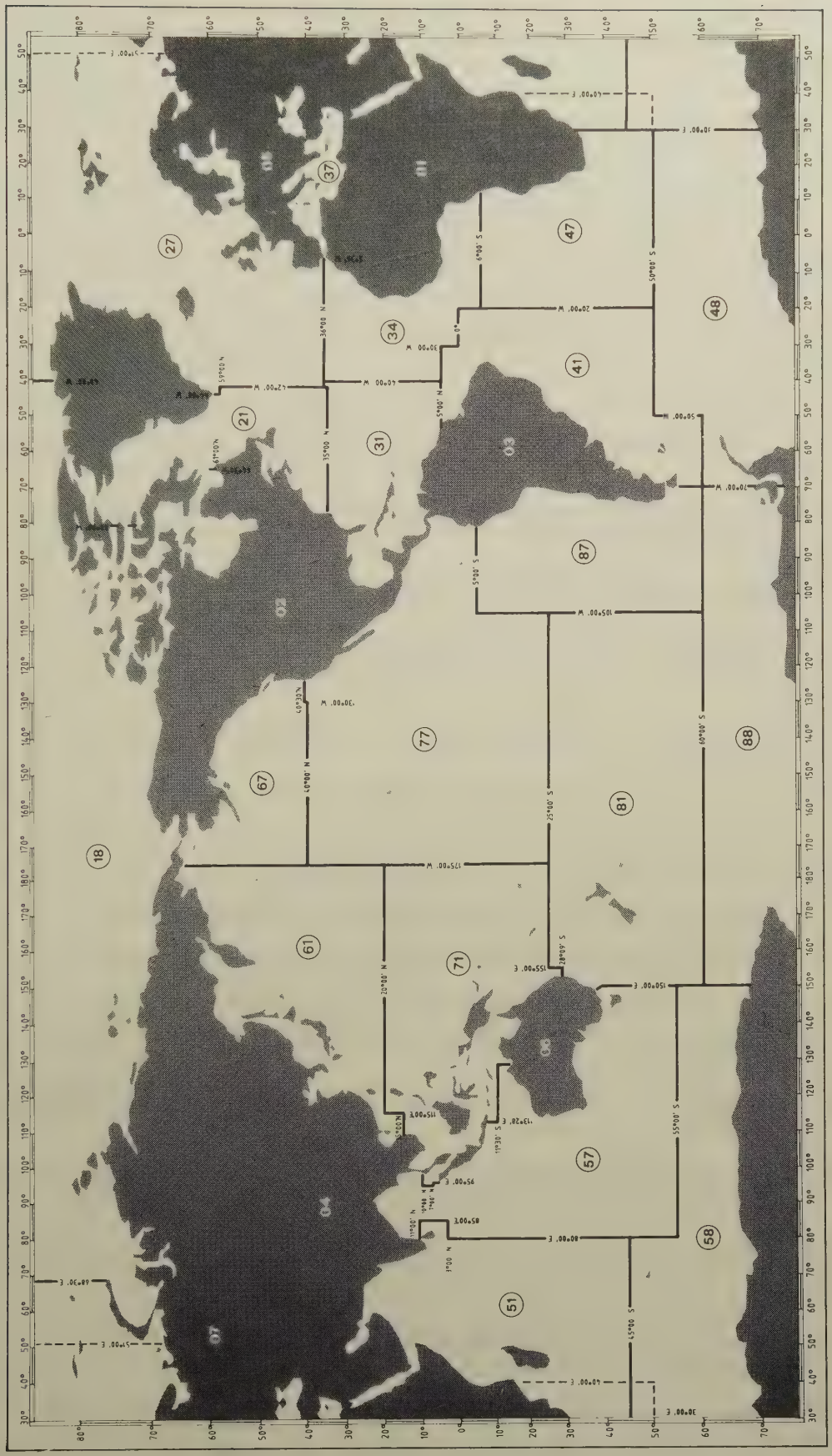
3. LIST OF NOMINAL SPECIES OF CAESIONIDAE

Nominal Species	Correct Name
Pristipomoides aurolineatus Day, 1867	*Pterocaesio chrysozona*
Caesio azuraureus Ruppell, 1830	*Caesio caerulaurea*
Smaris balteatus Valenciennes, 1830	*Dipterygonotus balteatus*
Caesio caerulaureus Lacepède, 1801	*Caesio caerulaurea*
Pterocaesio capricornis Smith & Smith, 1963	*Pterocaesio capricornis*
Caesio chrysozona Cuvier, 1830	*Pterocaesio chrysozona*
Sparus cuning Bloch, 1792	*Caesio cuning*
Caesio cylindricus Günther, 1859	*Pterocaesio tile*
Caesio digramma Bleeker, 1865	*Pterocaesio digramma*
Clupeolabrus dubius Nichols, 1930	*Pterocaesio tile*
Caesio erythrochilurus Fowler, 1904	*Caesio cuning*
Caesio erythrogaster Cuvier, 1830	*Caesio cuning*
Dipterygonotus gruveli Chabanaud, 1924	*Dipterygonotus balteatus*
Caesio gymnopterus Bleeker, 1856	*Gymnocaesio gymnoptera*
Pterocaesio kohleri Schultz, 1953	*Pterocaesio marri*
Pterocaesio lativittata Carpenter, 1987	*Pterocaesio lativittata*
Dipterygonotus leucogrammicus Bleeker, 1849	*Dipterygonotus balteatus*
Caesio lunaris Cuvier, 1830	*Caesio lunaris*
Caesio maculatus Cuvier, 1830	*Caesio caerulaurea*
Smaris mauritianus Quoy & Gaimard, 1824	*Caesio caerulaurea*
Caesio multiradiatus Steindachner, 1861	*Pterocaesio tile*
Caesio nori Thiollière, 1856	*Caesio caerulaurea*
Caesio pisang Bleeker, 1853	*Pterocaesio pisang*
Caesio pulcherrimus Smith & Smith, 1963	*Caesio teres*
Pterocaesio randalli Carpenter, 1987	*Pterocaesio randalli*
Caesio striatus Ruppell, 1830	*Caesio striata*
Caesio suevicus Klunzinger, 1884	*Caesio suevica*
Caesio teres Seale, 1906	*Caesio teres*
Pterocaesio tessellata Carpenter, 1987	*Pterocaesio tessellata*
Caesio tile Cuvier, 1830	*Pterocaesio tile*
Caesio tricolor Cuvier, 1830	*Pterocaesio tile*
Pterocaesio trilineata Carpenter, 1987	*Pterocaesio trilineata*
Caesio varilineata Carpenter, 1987	*Caesio varilineata*
Caesio xanthonotus Bleeker, 1853	*Caesio xanthonota*

4. LIST OF SPECIES BY MAJOR MARINE FISHING AREAS

SPECIES	PAGE	GEOGRAPHICAL DISTRIBUTION							
		MAJOR MARINE FISHING AREAS FOR STATISTICAL PURPOSES							
		51	57	58	61	67	71	77	81
Caesio caerulaurea	35	●	●		●		●	●	
Caesio cuning	37	●	●		●		●		
Caesio lunaris	38	●	●		●		●		
Caesio striata	40	●							
Caesio suevica	41	●							
Caesio teres	42	●	●		●		●	●	
Caesio varilineata	44	●	●						
Caesio xanthonota	45	●	●				●		
Dipterygonotus balteatus	47	●	●		●		●		
Gymnocaesio gymnoptera	49	●	●				●		
Pterocaesio capricornis	51	●							
Pterocaesio chrysozona	52	●	●		●		●		
Pterocaesio digramma	53		●		●		●		
Pterocaesio lativittata	55	●	●				●		
Pterocaesio marri	56	●	●		●		●	●	
Pterocaesio pisang	58	●	●				●		
Pterocaesio randalli	59						●		
Pterocaesio tessellata	60	●	●				●		
Pterocaesio tile	61	●	●		●		●	●	
Pterocaesio trilineata	63				●		●		●

MAJOR MARINE FISHING AREAS FOR STATISTICAL PURPOSES



5. BIBLIOGRAPHY

Alcala, A.C. & T. Luchavez, 1982. Fish yield of the coral reef sourrounding Apo Island, Negros Oriental, Central Visayas, Philippines. In Proceedings of the fourth International Coral Reef Symposium, edited by E.D. Gomez, et al. , Quezon City, Marine Sciences Center, University of the Philippines, Vol. 1: 69-73

Allen, G.R. ,1985. FAO Species Catalogue Vol. 6 Snappers of the World. An annotated and illustrated catalogue of lutjanid species known to date. FAO Fish.Synop., (125) Vol. 6:208 p.

Amesbury, S.S. & R.F. Myers, 1982. Guide to the Coastal Resources of Guam. Vol. 1. The fishes. Agan, Guam, University of Guam Press, 141 p.

Bell, L.J. & P.L. Colin, 1986. Mass spawning of ***Caesio teres*** (Pisces: Caesionidae) at Enewetak Atoll, Marshall Islands. Environ.Biol.Fish., 15(1):69-74

Bleeker, P., 1849. A contribution to the knowledge of the ichthyological fauna of Celebes. J.Indian Arch., 3:65-74

----------, **1853**. Derde bijdrage tot de kennis der ichthyologische fauna van Amboina. Nat.Tijdschr.Ned.-Indië, 4:91-130

----------, **1853a**. Diagnostische beschrijvingen van nieuwe of weinig bekende vischoorten van Batavia. Tiental 1-6. . Nat.Tijdschr.Ned.-Indië, 4:451-516

----------, **1856** Zevende bijdradge tot de kennis der ichthyologische fauna van Ternate. Nat.Tijdschr.Ned.-Indië, 10: 357-86

----------, **1865**. Description de quelques espèces inédites de poissons de L'Archipel des Moluques. Ned.Tijdschr. Dierk., 2:177-81

----------, **1873**. Révision des espèces indo-archipélagiques du genre **Caesio** et de quelques genres voisins. Arch. Néerl. Sci.Nat., 8:155-82

----------, **1876**. Notice sur les genres ***Gymnocaesio, Pterocaesio, Paracaesio*** et ***Liocaesio***. Versl.Akad.Amsterdam (Ser. 9 Aftd.Nat), 2:149-54

----------, **1876a** Systema Percarum revisum. Pars I. Arch.Néerl.Sci.Nat., 11:247-88

Bloch, M.E. , 1790. Naturgeschichte der ausländischen Fische, Vol. 4. Berlin, J. Morino, 128 p.

----------, **1791**. Naturgeschichte der ausländischen Fische. Vol. 5. Berlin, J. Morino, 152 p.

Bradbury, R.H. & G.B. Goeden, 1974. The partitioning of the reef slope environment by resident fishes. In Proceedings of the second International Coral Reef Symposium, edited by A.M. Cameron, et al. Brisbane, Great Barrier Reef Committee, Vol. 1:167-78

Burgess, W. & H.R. Axelrod, 1975. Pacific marine fishes. Book 6. Fishes of Melanesia. Neptune City, New Jersey, T.F.H. Publications, Inc., pp. 1382-1654

Cabanban, A.S., 1984. Some aspects of the biology of ***Pterocaesio pisang*** (Bleeker, 1853) (Pisces: Caesionidae) in the central Visayas. Masters thesis. College of Science, University of the Philippines, 69 p.

Carpenter, K.E., 1985. A taxonomic revision of the Indo-Pacific fish family Caesionidae (Perciformes: Lutjanoidea) with comparisons of numerical evolutionary systematic, phylogenetic, and phenetic classifications. Ph.D. Dissertation, Department of Zoology, University of Hawaii, 250 p.

----------, **1987**. Revision of the Indo-Pacific fish family Caesionidae (Lutjanoidea), with descriptions of five new species. Indo-Pac.Fish., 15:1-56

Chabanaud M.P., 1924. Remarques sur ***Dipterygonotus gruveli*** Chab. et sur la famille des Dipterygonotidae. Bull.Soc. Zool.Fr., 49:248-56

----------, **1924a**. Description de deux poissons de mer nouveaux d'Indo-Chine. Bull.Mus.Natl.Hist.Nat., Paris, 30:57-60

Chabanaud, M.P., 1925. Remarques sur divers percoides du groupe des *Caesio* Cuvier. Bull.Soc.Zool.Paris., 50:151-9

Clark, E., A. Ben-Tuvia & H. Steinitz, 1968. Observations on a coastal fish community, Dahlak Archipelago, Red Sea. Bull.Sea Fish.Res.Stn.Haifa, 49:15-31

Coleman, N., 1981. Australian sea fishes north of 30° S. Sydney and Auckland, Doubleday, 287 p.

Cuvier, G. & A. Valenciennes, 1830. Histoire naturelle des Poissons. Paris, F.G. Levrault, Vol. 6:559 p.

Day, F., 1867. On some new or imperfectly known fishes of Madras. Proc.Zool.Soc.Lon., 935-42

----------, **1875**. The fishes of India; being a natural history of the fishes known to inhabit the seas and freshwaters of India, Burma and Ceylon. London, Bernard Quaritch, 778 p.

Dingerkus, G. & F. Uhler, 1977. Enzyme clearing of alcian blue stained whole small vertebrates for demonstration of cartilage. Stain.Technol., 52(4):229-32

FAO, 1986. Yearbook of fishery statistics. Annuaire statistique des pêches. Anuario estadístico de pesca, 1984. Catches and landings. Capture et quantités débarquées. Capturas y desembarques. Yearb.Fish.Stat./Annu.Stat.Pêches/Anu.Estad.Pesca, 58:451 p.

Fischer, W. & G. Bianchi (eds), 1984. FAO species identification sheets for fishery purposes. Western Indian Ocean (fishing area 51). Prepared and printed with the support of the Danish International Development Agency (DANIDA). Rome, FAO, 6 vols:pag.var.

Fishelson, L., 1977. Sociobiology of feeding behavior of coral fish along the coral reef of the Gulf of Elat (= Gulf of Aqaba), Red Sea. Isr.J.Zool., 26:114-34

Formanoir, P.& P. Laboute, 1976. Poissons de Nouvelle Calédonie et des Nouvelles Hébrides. Papeete, Les Editions du Pacifique,.376 p.

Fowler, H.W., 1904. A collection of fishes from Sumatra. J.Acad.Nat.Sci.Philad., 12(4):497-560

----------, **1928**. The fishes of Oceania. Mem.Bernice P.Bishop Mus., 10:1-540

----------, **1931**. Contributions to the biology of the Philippine Archipelago and adjacent regions. The fishes of the families Pseudochromidae, Lobotidae, Pempheridae, Priacanthidae, Lutjanidae, Pomadaysidae, and Teraponidae, collected by the U. S. Bureau of Fisheries Steamer "Albatross," chiefly in Philippine seas and adjacent waters. Bull.U.S.Natl.Mus., 100(11):1-388

----------, **1934**. The fishes of Oceania. Supplement 2. Mem.Bernice P.Bishop Mus., 6(6):385-466

----------, **1938**. A list of fishes known from Malaya. Fish.Bull.Straits Settlement, Singapore, (1):268 p.

Fowler, H.W. & B.A. Bean, 1922. Fishes from Formosa and the Philippine islands. Proc.U.S.Natl.Mus., 62(2):1-73

Gerber, R.P. & N. Marshall, 1974. Ingestion of detritus by the lagoon pelagic community at Enewetok Atoll. Limnol.Oceanogr., 19(5):815-24

Gloerfelt-Tarp, T. & P.J. Kailola, 1984. Trawled fishes of southern Indonesia and northwestern Australia. Australian Development Assistance Bureau, Australia; The Directorate General of Fisheries, Indonesia; The German Agency for Technical Cooperation, Federal Republic of Germany. Singapore, Tien Wah Press, 406 p.

Günther, A., 1859. Catalogue of the Acanthopterygian fishes in the collection of the British Museum. London, British Museum, Vol. 1:524 p.

----------, **1873**. Andrew Garrett's Fische der Südsee. Heft I. J.Mus.Godeffroy , 2(3):1-24

Heemstra, P.C. & J.E. Randall, 1977. A revision of the Emmilichthyidae (Pisces: Perciformes). Aust.J.Mar Freshwat.Res., 28:361-96

Herre, A.W., 1953. Check list of Philippine fishes. Res.Rep.U.S.Fish Wildl.Serv., (20):977 p.

Hiatt, R.W. & D.W. Strasburg, 1960. Ecological relationships of fish fauna on coral reefs of the Marshall Islands. Ecol.Monogr., 30:65-127

Hobson, E. S. & J.R. Chess, 1978. Trophic relationships among fishes and plankton in the lagoon at Enewetak Atoll, Marshall Islands. Fish. Bull.NOAA/NMFS, 76:133-53

Hubbs, C.L. & K.F. Lagler, 1958. Fishes of the Great Lakes region. Ann Arbor, Michigan, University of Michigan Press, 213 p.

Johnson, G.D., 1980. The limits and relationships of the Lutjanidae and associated families. Bull.Scripps Inst.Oceanogr., 24:1-114

Jones, S., 1958. The tuna live-bait fishery of Minicoy. Indian J.Fish., 5(2):300-7

----------, **1964**. A preliminary survey of the common tuna bait fishes of Minicoy and their distribution in the Laccadive Archipelago. Symp.Ser.Mar.Biol.Assoc.India, 1(2):643-80

Jones, S. & M. Kumaran, 1980. Fishes of the Laccadive Archipelago. Kerala, India, The Nature and Conservation, and Aquatic Sciences Service, 760 p.

Klunzinger, C.B., 1870. Synopsis der Fische des Rothen Meeres. Verh.Zool.-Bot.Ges.Wien, 20:669-834

----------, **1884**. Die Fische des Rothen Meeres. Stuttgart, E. Schweizerbartsche, 133 p.

Lacepède, B.G., 1801. Histoire naturelle des poissons. Paris, Chez Plassan, Vol. 3:558 p.

Lewis, A.D. B.R. Smith & C.P. Ellway, 1983. A guide to the common tuna baitfishes of the South Pacific Commission. Handb.SPC, (23):82 p.

Marshall, T.C., 1964. Fishes of the Great Barrier Reef and Coastal Waters of Queensland. Narberth, Penn. Livingston Publishing Company, 566 p.

Masuda, H., C. Araga, & T. Yoshino, 1975. Coastal fishes of southern Japan. Tokyo, Tokai University Press, 382 p.

Munro, I.S.R., 1955. The marine and freshwater fishes of Ceylon. Canberra, Department of External Affairs, 351 p.

----------, **1967**. The fishes of New Guinea. Port Moresby, New Guinea, Department of Agriculture, Stock and Fisheries, 651 p.

Nichols, J.T., 1923. Two new fishes from the Pacific Ocean. Am.Mus.Nov., 94:1-3

Norman, J.R., 1966. A draft synopsis of the orders, families and genera of recent fishes and fish-like vertebrates. London, British Museum (Natural History), 649 p. Unpubl. photo offset copy.

Quoy, J.R. C. & P. Gaimard, 1824. Poissons. In Voyage autour du monde, executé sur les corvettes de S. M. "L'Uranie" et "La Physicienne" pendent les années 1817-20. Paris, Pillet Aine, pp. 192-401

Randall, J.E., 1955. Fishes of the Gilbert Islands. Atoll Res.Bull., (47):1-243 p.

----------, **1983**. Red Sea reef fishes. London, Immel Publishers, 192 p.

Randall, J.E G.R. Allen, & W. F. Smith-Vaniz, 1978. Illustrated identification guide to commercial fishes. Regional fishery survey and development project. Bahrain, Iran, Iraq, Kuwait, Oman, Qatar, Saudi Arabia, United Arab Emirates. Rome, FAO/UNDP, FI:DP/RAB/71/278/3. 221 p.

Rau, N. & A. Rau, 1980. Commercial marine fishes of the central Philippines (Bony fishes). Schr.Dtsch.Ges.-Tech.Zusammenarb., (9):623 p.

Relyea, K., 1981. Inshore fishes of the Arabian Gulf. London, George Allen & Unwin, 149 p.

Rofen, R.R., 1963. Handbook of the food fishes of the Gulf of Thailand. Spec.Rep.Aquat.Res.Inst. Port of Stockton, (1):236 p.

Rüppell, E., 1830. Atlas zu der Reise im nördlichen Afrika. Von Eduard Rüppell, Zoologie 4, Fische des Rothen Meers. Frankfurt, H.L. Brönner, pp. 94-141

----------, **1838**. Neue Wirbelthiere zu der Fauna von Abyssinien gehőig. In Fische des rothen Meeres. Frankfurt, Siegmund Schmerber, pp. 81-148

Sainsbury, K.J., P.J. Kailola & G.G. Leyland, 1984 Continental shelf fishes of northern and north-western Australia: an illustrated guide. Canberra, Australia, CSIRO, 375 p.

Schneider, J.G., 1801. M. E. Blochii, . . . Systema Ichthyologiae iconibus cx illustratum. Berolini, Bibliopolio Sanderiano Commissum, 584 p.

Schroeder, R.E., 1980. Philippine shore fishes of the western Sulu Sea. Manila, National Media Production Center, 266 p.

Schultz, L.P. et al., 1953. Fishes of the Marshall and Marianas Islands. Bull.U.S.Natl.Mus., (202):685 p

Seale, A., 1906. Fishes of the South Pacific. Occas.Pap.Bernice P. Bishop Mus., 4(1):1-89

Shen, S.C., 1984. Coastal fishes of Taiwan. Taipei, Shih-chieh Shen (Private printing), 190 p.

Shivasubramaniam, K. & M.A. Ibrahim, 1982. Common fishes of Qatar. Qatar, Doha Modern Printing Press, 176 p.

Smith, J.L.B., 1949. The sea fishes of Southern Africa. Cape Town, Central News Agency, Ltd., 550 p.

----------, **1955**. The fishes of Aldabra. Part 3. Ann.Mag.Nat.Hist., 12(8):886-96

----------, **1963**. New species and new records of fishes from the western Indian Ocean. Ann.Mag.Nat.Hist., 13(6):33-7

Smith, J.L.B. & M.M. Smith, 1963. The fishes of Seychelles. Grahamstown, Rhodes University, 215 p.

Snyder, J.O., 1912. The fishes of Okinawa, one of the Riu Kiu Islands. Proc.U.S.Natl.Mus., 42(1913):487-519

Steindachner, F., 1861. Ichthyologische Mittheilungen. 3. Verh.Zool.-Bot.Ges.Wien , 11:175-82

Steyskal, G.C., 1980. The grammar of family-group names as exemplified by those of fishes. Proc.Biol.Soc.Wash., 93:168-77

Thiollière, V.J., 1856. Ichthyologie. In Essai sur la faune de l'île de Woodlark ou Moiou, by P. Montrouzier. Ann.Sci. Phys.Nat.Agric.Lyon (Ser. 2), 8:417-504

Thomas, P.T., 1964. A study on the fluctuations in the occurrence of the major tuna live-bait fishes of Minicoy. Symp.Ser.Mar.Biol.Assoc.India., 1(2):681-92

Thresher, R.E., 1984. Reproduction in reef fishes. Neptune City, N.J., T.F.H. Publications, 399 p.

Weber, M. & L.F. de Beaufort, 1936. The fishes of the Indo-Australian Archipelago. Leiden, E. J. Brill, Vol. 7:607 p.

Whitehead P.J.P. & P.K. Talwar, 1976. Francis Day (1829-1889) and his collections of Indian fishes. Bull. Br.Mus.(Nat.Hist.) (Histor.Ser.), 5(1):189 p.

Wiley, E.O., 1981. Phylogenetics. New York, John Wiley and Sons, 419 p.

Wilson, P.T., 1977. Ponape live bait observations. NOAA Tech.Rep.NMFS Circ., (408):75-80

6. INDEX OF SCIENTIFIC AND VERNACULAR NAMES

EXPLANATION OF THE SYSTEM

The index applies exclusively to the genera and species accounts (Section 2.2 Information by Species)

Type faces used:

Italics (bold) : Valid scientific names (double entry by genera and species)

Italics : Synonyms (double entry by genera and species)

Roman (bold) : International (FAO) species names

Roman : Local species names

Page

A

aurolineatus, Pristipomoides 52
azuraureus, Caesio 35

B

balteatus, Dipterygonotus 47
balteatus, Smaris 47
Banana fusilier 58
Baranti 36
Bawang 36
Bidlawan 53,59
Bilason 44
Biluson 38
Blue and gold fusilier 35

C

Cá cham bi 38
caerulaurea, Caesio 35
caerulaureus, Caesio 35
Caesio 35
Caesio à ceinture d'or 52
Caesio à croissant 38
Caesio à ventre rouge 37
Caesio azuraureus 35
Caesio azuror 35
Caesio caerulaurea 35
Caesio caerulaureus 35
Caesio chrysozona 52
Caesio cuning 37
Caesio cylindricus 61
Caesio digramma 53
Caesio erythrochilurus 37
Caesio erythrogaster 37
Caesio gymnopterus 49
Caesio lunaris 38
Caesio maculatus 35
Caesio multiradiatus 61
Caesio nori 35
Caesio pisang 58
Caesio pulcherrimus 42
Caesio striata 40
Caesio striatus 40
Caesio suevica 41
Caesio suevicus 41
Caesio teres 42
Caesio tile 61
Caesio tricolor 61
Caesio varilineata 44
Caesio xanthonota 45
Caesio xanthonotus 45
Capricorn fusilier 51
capricornis, Pterocaesio 51
Cavi 38
chrysozona, Caesio 52
chrysozona, Pterocaesio 52
Churaichala 45,53,59
Cichla cuning 37
Clupeolabrus 50
Clupeolabrus dubius 61
Cul kilchi 38
cuning, Caesio 37
cuning, Cichla 37
cuning, Sparus 37
cylindricus, Caesio 61

Page

D

Dalagang bukid 36,40,44,50,53,55, 57,59,60,61,63
Dalagang bukid lapad 38
Dandi mugurang 50
Dark-banded fusilier 61
Delah 40
Delah karang 53
Dhandi muguram 48
digramma, Caesio 53
digramma, Pterocaesio 53
Dipterygonotus 47
Dipterygonotus balteatus 47
Dipterygonotus gruveli 47
Dipterygonotus leucogrammicus 47
Dongio mas 36
Donkevumas 47
Donnomas 47
Double-lined fusilier 53
dubius, Clupeolabrus 61
Duri 36,63

E

Ekor kuning 38
Ekor kuning pisang 44,47
erythrochilurus, Caesio 37
erythrogaster, Caesio 37

F

Furrua 45,53
Fusilero aceitunero 61
Fusilero amarillo azulado 42
Fusilero azur 35
Fusilero banana 58

	Page
Fusilero capricornio	51
Fusilero cinta dorada	52
Fusilero de banda ancha	55
Fusilero de dos bandas	53
Fusilero de lomo amarillo	45
Fusilero de Marr	56
Fusilero de Randall	59
Fusilero de Suez	41
Fusilero de tres bandas	63
Fusilero de una banda	60
Fusilero elegante	49
Fusilero estriado	40
Fusilero jaspeado	47
Fusilero listado	44
Fusilero luna	38
Fusilero vientre colorado	37
Fusilier à bande large	55
Fusilier à bandes variées	44
Fusilier à deux bandes jaunes	53
Fusilier à dos jaune	45
Fusilier à dos jaune et bleu	42
Fusilier à ligne olive	61
Fusilier à trois bandes	63
Fusilier à une bande	60
Fusilier banane	58
Fusilier capricorne	51
Fusilier de Marr	56
Fusilier de Randall	59
Fusilier de Suez	41
Fusilier élégant	49
Fusilier marbré	47
Fusilier strié	40

G

Gawani	53
Goldband fusilier	52
Gowana	36
gruveli, Dipterygonotus	47
Gymnocaesio	49
Gymnocaesio gymnoptera	49
gymnoptera, Gymnocaesio	49
gymnopterus, Caesio	49

H

Hana takasagu	40
Hemala	53
Huden mugurang	53,59

I

Ikonid	36,63
Ilitta	53

K

Kekkurimugrhang	45
Kera	38
Kibiri	36
kohleri, Pterocaesio	56
Kumasasa hanamuro	63

L

Lapi	38
lativittata, Pterocaesio	55
leucogrammicus, Dipterygonotus	47
Liocaesio	50
Lunar fusilier	38
lunaris, Caesio	38

M

maculatus, Caesio	35
Marr's fusilier	56
marri, Pterocaesio	56
mauritianus, Smaris	35
Moon caesio	40
Morong	40,44
Mottled fusilier	47
multiradiatus, Caesio	61

N

Nisen takasago	55
nori, Caesio	35

O

Odontonectes	35
One stripe fusilier	60

	Page
P	
pisang, Caesio	58
Pisang-pisang	36,40,53,59
pisang, Pterocaesio	58
Pla hang luang	38
Pla lerng prong mor	36
Pristipomoides aurolineatus	52
Pterocaesio	50
Pterocaesio capricornis	51
Pterocaesio chrysozona	52
Pterocaesio digramma	53
Pterocaesio kohleri	56
Pterocaesio lativittata	55
Pterocaesio marri	56
Pterocaesio pisang	58
Pterocaesio randalli	59
Pterocaesio tessellata	60
Pterocaesio tile	61
Pterocaesio trilineata	63
pulcherrimus, Caesio	42
R	
Randall's fusilier	59
randalli, Pterocaesio	59
Redbelly yellowtail fusilier	37
Ry mugurang	63
S	
Sasamuro	36
Sinao an	40
Slender fusilier	49
Smaris balteatus	47
Smaris mauritianus	35
Sparus cuning	37
striata, Caesio	40
Striated fusilier	40
striatus, Caesio	40
suevica, Caesio	41
suevicus, Caesio	41
Suez fusilier	41
Sulid	36,40,44,50,63
T	
Takasago	53,59
teres, Caesio	42
tessellata, Pterocaesio	60
Three-stripe fusilier	63
tile, Caesio	61
tile, Pterocaesio	61
Tinika	36,63
Tinipu	36, 63
Tosoku chibiki	48
tricolor, Caesio	61
trilineata, Pterocaesio	63
U	
Utdan	55
V	
Vaber-vaber	36
Variable-lined fusilier	44
varilineata, Caesio	44
W	
Wide-band fusilier	55
X	
xanthonota, Caesio	45
xanthonotus, Caesio	45
Y	
Yellow and blueback fusilier	42
Yellow tail fusilier	38
Yellowback fusilier	45
Yume umeiro	38

M-40/T0046E/1/1.89/2500
ISBN 92-5-102746-3